United States Department of the Interior
Bureau of Land Management

DOI-BLM-MT-0000-2018-0002-EA

Oil and Gas Lease Parcel Sale
December 11, 2018

Location: **Butte, Billings. Dillon, Glasgow, Havre, Miles City, and North Dakota Field Offices (see Appendix A for list of lease parcels by number and legal description)**

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Table of Contents

Table of Tables

Table of Figures

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

Proposed Action and Background

The Bureau of Land Management (BLM) Montana/Dakotas State Office conducts Oil and Gas Federal mineral estate lease auctions for lands managed by the Federal Government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation (BOR)), United States Forest Service, or other departments and agencies. These auctions also include split estate lands, where the BLM holds subsurface mineral rights, but a party other than the Federal Government owns the surface estate. The Montana/Dakota's State Office has historically conducted four lease sales per year. The BLM's authority to conduct these lease sales is based on various laws including, the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. The BLM will self-nominate a parcel if an existing well is draining federal minerals or for other reasons. From these EOIs, the Montana/Dakotas State Office provided draft parcel lists to the field offices for review, and completed a Lease Prioritization Sequence on the nominated parcels in accordance with WO IM No. 2018-026, and consistent with conservation objectives in the 2015 Rocky Mountain and Great Basin Region Record of Decisions and the applicable Approved Resource Management Plans (ARMPs). The Montana/Dakotas State Office reviewed the prioritized parcels, which were carried forward and further reviewed by the field offices to determine:

1. if they are in areas open to leasing;
2. if new information has come to light which might change previous analyses conducted during the land use planning process;
3. if there are special resource conditions of which potential bidders should be made aware; and,
4. which stipulations should be identified and included as part of a lease.

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing 102 nominated lease parcels and part of one additional parcel encompassing approximately 69,270 Federal mineral acres located across the MT/Dakotas BLM, to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on September 11, 2018. The analysis area includes parcels proposed for lease in Billings, Butte, Dillon, Havre, Glasgow, Miles City, and North Dakota Field Offices (Table 1 below) (See parcel maps in Appendix C). Offering parcels for competitive oil and gas leasing provides opportunities for private individuals or companies to explore and develop federal oil and gas resources after receipt of necessary approvals, and to sell the oil and gas in public markets.

Table 1: Proposed Action: Parcels/Acres of BLM surface, private surface and other lands in the proposed lease sale, as well as deferred parcels.

Field Office	County	BLM Surface (# parcels / acres)	Private Surface (# parcels / acres)	Other (# parcels/acres)	Deferred (# parcels / acres)
Billings	Carbon	6 parcels/3761.66 acres	1 parcel/40 acres		2 + part of 1 parcels (KG, KC) / 841.63 acres
	Musselshell	6 parcels/2960.29 acres	1/parcel/989.48 acres		0
	Sweet Grass			1 parcel/75.37 acres	1 parcel (GU) / 75.37 acres
Butte	Lewis & Clark		1 parcel/1463.26 acres		
	Park	1 parcel/50.27 acres	1 parcel/320 acres	1 parcel/392.11 acres	1 parcel (FY) / 762.38 acres
Dillon	Beaverhead	9 parcels/8769.97 acres	8 parcels/3720.36 acres		
	Madison		1 parcel/398.69 acres		
Glasgow	Valley	9 parcels/10717.32 acres	4 parcels/635.02 acres		
Havre	Blaine	4 parcels/1705.19 acres	2 parcels/54.26 acres		
	Glacier		1 parcel/453.75 acres	2 parcels/36.40 acres	
	Toole	5 parcels/1817.78 acres	6 parcels/3143.09 acres		
Lewistown	Meagher		6 parcels/3082.68 acres		6 parcels (G3, EK, GY, EH, GX, HN) / 3082.68 acres
	Petroleum	5 parcels/1180.51 acres	4 parcels/1580.12 acres		8 parcels (C8, C9, DA, CX, CY, C3, HB, KP) / 2760.63 acres
Miles City	Big Horn	9 parcels/1141.98 acres	12 parcels/5851.65 acres		
	Custer	1 parcel/320 acres	1 parcel/320 acres		

Field Office	County	BLM Surface (# parcels / acres)	Private Surface (# parcels / acres)	Other (# parcels/acres)	Deferred (# parcels / acres)
	Dawson	3 parcels/1424.55 acres	5 parcels/1370.97 acres		
	Fallon	4 parcels/1839 acres			
	Sheridan		1 parcel/79.76 acres		
	Roosevelt	13 parcels/12178.30 acres	13 parcels/4757.61 acres		
	Rosebud		1 parcel/120 acres		
	Sheridan				
North Dakota	Bowman	1 parcel / 40.0 acres			
Total					7521 acres

Note: Surface ownership may be split between BLM, Private, or Other on any one parcel so the sum of parcels by surface owner will appear larger than the total number of parcels in the sale.

Purpose and Need

The purpose and need for this action is to respond to EOIs to lease parcels of land for oil and gas development as mandated by Federal laws, including the Mineral Leasing Act of 1920, Federal Land Policy and Management Act of 1976, and Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Decision to be Made

Based on this review and public comment, the BLM will determine whether or not to offer to sell and issue oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

Conformance with Land Use Plans

This EA is tiered to the information and analysis and conforms to the decisions contained in the Billings, Miles City, and HiLine RMPs of September 2015, Butte RMP of April 2009, Dillon RMP of February 2006, and the North Dakota RMP of April 1988. Each of these plans are the governing land use plan for their respective geographic area. The lease parcels to potentially be offered for sale are within an area determined to be open to oil and gas leasing in the RMPs. An electronic copy of these planning documents are available via the internet on the BLM e-Planning page: https://eplanning.blm.gov/epl-front-office/eplanning/lup/lup_register.do.

BLM resource specialists prepared this EA to document the analysis of the lease parcels and recommended appropriate stipulations based upon professional knowledge of the areas involved, review of current databases, and file information.

At the time of this review it is unknown whether or not a particular parcel will be sold and a lease issued. It is also unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for the respective Field Offices.

For all leases, a detailed site-specific analysis and mitigation of activities associated with any particular lease development would occur when a leaseholder submits an Application for Permit to Drill (APD). For split estate leases, where the surface is not federally owned and the minerals are federally owned, an additional agreement could be made through which the operator and surface owner can discuss the preferences and needs of the surface owner. In both scenarios, the APD Surface Use Plan of Operations should contain sufficient detail about any aspects of the agreement necessary for National Environmental Policy Act (NEPA) documentation and to determine that the operations will be in compliance with laws, regulations, Onshore Orders, and agency policies.

A more complete description of mitigation, Best Management Practices (BMPs), and conditions of approval related to oil and gas lease activities can be found in the corresponding RMP for each parcel, and the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book 4th Ed.

Public Involvement, Consultation, and Coordination

Public scoping for this project was conducted through a 15-day scoping period of July 6 to July 20, 2018, as described in a Press Release issued by the Montana State Office, advertised on the BLM Montana State Office website, and posted online in the BLM NEPA e-Planning website. Public scoping comments were received from private landowners, Native American Tribes, government agencies, and environmental groups concerning ranching operations, National Historic Trails, National Environmental Policy Act,

Federal Land Policy and Management Act, Resource Management Plans, hydraulic fracturing, fisheries, recreation, climate change, social cost of carbon, greater sage-grouse, and water, air, wildlife, and cultural resources.

A 15-day public comment period on this EA was conducted from August 10-24, 2018, as announced in a Press Release issued by the Montana State Office and described online in the BLM NEPA e-Planning website. Public comments on the EA were received from private landowners, Native American Tribes, government agencies, and environmental groups concerning ranching operations, National Historic Trails, National Environmental Policy Act, Federal Land Policy and Management Act, Resource Management Plans, hydraulic fracturing, fisheries, recreation, climate change, social cost of carbon, greater sage-grouse, and water, air, wildlife, and cultural resources.

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the U.S. Fish and Wildlife Service (FWS) to manage wildlife. While the BLM manages habitat on BLM lands, MFWP is responsible for managing all wildlife species populations. The FWS also manages some wildlife populations but only those federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. The BLM mailed letters to FWP and USFWS informing them of scoping and EA comment periods, as well as communicated informally with them to identify wildlife concerns, protective measures, and apply stipulations and lease notices associated with the lease parcels.

The BLM consults with Native Americans under various statutes, regulations, and executive orders, including the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the National Environmental Policy Act, and Executive Order 13175-Consultation and Coordination with Indian Tribal Governments. The BLM sent letters to consulting tribes seeking comments during the scoping and EA comment periods, informing them of proposed lease sale, and invited them to submit issues and concerns BLM should consider in the environmental analysis.

The BLM also mailed letters to local, state and federal agencies, Tribal entities, and private surface owners informing them of the lease sale and seeking comments, and received approximately 250 unique comments in response to scoping. Comments were submitted from numerous split estate surface owners, concerned citizens, public interest groups, and government agencies concerning ranching operations, National Historic Trails, National Environmental Policy Act, Federal Land Policy and Management Act, Resource Management Plans, hydraulic fracturing, fisheries, recreation, climate change, social cost of carbon, greater sage-grouse, and water, air, wildlife, and cultural resources.

Resource Issues Identified for Analysis

Analysis issues include resource issues that could potentially be affected by oil and gas leasing. Consistent with Title 43 Code of Federal Regulations 3131.3, the BLM identified lease stipulations for proposed parcels based upon resource concerns that were identified during previous land use planning processes. The BLM focuses its analysis on "issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)).

Site specific resource concerns were identified by the BLM through the preliminary review process conducted prior to a 15-day public scoping period. Lease stipulations (as required by Title 43 Code of Federal Regulations 3131.3) were added as necessary to each parcel as identified by the BLM to address site specific resource concerns. Additional site specific resource concerns were identified by the public during the 15-day scoping period.

The following resources/issues will be analyzed in this EA:

Issue 1: Air Resources

How would development of these parcels affect air quality; air quality related values (AQRV); and associated impacts such as atmospheric deposition and visibility, and greenhouse gas emissions/climate?

Issue 2: Socio-economic Conditions & Environmental Justice

How would the leasing and potential development of these parcels affect local community and county social conditions such as quality of life, infrastructure, public services, and schools?

Would the leasing and potential development of these parcels disproportionately adversely affect environmental justice populations (minority populations, low-income populations and/or Tribes)?

How would the leasing and potential development of these parcels affect local economic activity and revenues for federal, local and state governments?

Issue 3: Water Resources

How would development of these parcels, through construction, drilling and production activities as well as the use of hydraulic fracturing, impact water resources?

Issue 4: Greater Sage-Grouse

How would leasing and potential development of these parcels affect conservation of greater sage-grouse habitat?

Resources and Resource Issues Considered but Eliminated from Further Analysis

The following issues are not present and not considered in this EA: lands and realty conflicts, coal, locatable and salable minerals, forest and woodland, lands with wilderness characteristics, cave and karst resources, wild and scenic rivers and wilderness study areas.

Other resource issues BLM considered but eliminated from further analysis due to environmental impacts previously analyzed through prior NEPA reviews and the application of lease stipulations developed to mitigate the impacts are discussed below:

CULTURAL RESOURCES: the application of lease terms and the cultural resource lease notices (LN 14-2, LN 14-5, LN 14-14, LN 14-22, LN 14-25, LN 14-32, LN 14-33, LN 14-34, LN 14-38) at leasing provides protection to cultural resources. The BLM will not approve any ground disturbing activities that may affect such properties or resources until it completes its obligations associated with the stipulations that are applied to each respective parcel as well as applicable requirements of the National Historic Preservation Act and any other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

PALEONTOLOGY: The application of lease terms and the paleontological lease notices (LN 14-3, LN 14-5, LN 14-12, LN 14-29, and LN 14-30) at leasing provides protection to paleontological resources. The paleontological lease notices LN 14-12 and LN 14-30 are applied to those lease parcels that fall within geological units with a PFYC Class of 3 or higher. Leased lands that fall in to this category could require professional assessment which may include a field survey prior to surface disturbance. The results of the assessment and survey by a BLM-permitted paleontologist will serve as the basis for a mitigation

plan during development. If the inventory resulted in the identification of paleontological resources, mitigation measures such as avoidance, professional monitoring, development of an Unanticipated Resource Discovery Plan or salvage would be initiated by BLM and the operator.

NATIVE AMERICAN RELIGIOUS CONCERNS: The application of lease terms and lease notice 14-38 was applied to parcels identified as having possible historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O 13007, or other statutes and executive orders.. The purchaser of a lease is entitled to develop the parcel consistent with lease stipulations and must have an approved Application for Permit to Drill (APD), including a plan of operations and a review and consideration of Native American religious concerns, before ground disturbing activities can begin. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

SOIL RESOURCES AND VEGETATION: Stipulations, in addition to the Standard Lease 16-3, have been applied to applicable parcels to mitigate any impacts associated with leasing or development of these parcels. At the time of exploration or development the APD surface use plan of operations will include design features and mitigation measures to reduce, avoid, or minimize potential impacts to soil and vegetative resources consistent with the RMP for the respective planning area.

RPARIAN- WETLAND HABITATS: Stipulations, in addition to the Standard Lease 16-3, have been applied to applicable parcels to mitigate any impacts associated with leasing or development of these parcels. At the time of exploration of development the APD surface use plan of operations will include design features, and mitigation measures to reduce, avoid, or minimize impacts to riparian-wetland areas, consistent with the RMP for the respective planning area. Additionally, all stipulations related to setback distances from the edge of the wetlands, streams and rivers will be adhered to and consistent with the RMP for the respective planning area.

WILDLIFE:
Aquatic Wildlife: Applying timing limit, controlled surface use, and no surface occupancy lease stipulations in addition to TES 16-2 (Endangered Species Act Section 7 Consultation) protects aquatic wildlife sensitive species. The TES 16-2 stipulation mandates that the BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation. .
Terrestrial Wildlife: Applying timing limit, controlled surface use, and no surface occupancy lease stipulations in addition to TES 16-2 (Endangered Species Act Section 7 Consultation) protects terrestrial wildlife sensitive species.

Threatened and Endangered Species:

Table 2: USFWS Listed Species and Habitat occurrence in proposed MT/Dakotas December 2018 Oil and Gas Lease Sale

County/Scientific Name	Common Name	Status	Species Present in Lease Parcels	Suitable Habitat Present in Lease Parcels	If species and/or habitat are present, identify stipulations that would avoid/minimize impacts to the species.
Sweet Grass County					
Lynx canadensis	Canada Lynx	**LT, CH**	**No**	**No**	
Gulo gulo luscus	Wolverine	P	**No**	**No**	
Pinus albicaulis	Whitebark Pine	C	**No**	**No**	
Mustela nigripes	Black-footed Ferret	LE	**No**	**Un-Likely**	**LN 14-21, LN 14-19, TES 16-2**
Ursos arctos horribilis	Grizzly Bear	LT	**No**	**No**	
Musselshell County					
Mustela nigripes	Black-footed Ferret	LE	**No**	**Un-Likely**	**LN 14-21, LN 14-19, TES 16-2**
Calidris canutus rufa	Red Knot	LT	**No**	**No**	
Carbon County					
Lynx canadensis	Canada Lynx	**LT, CH**	**No**	**No**	
Gulo gulo luscus	Wolverine	P	**No**	**No**	
Zapada glacier	Western Glacier Stonefly	P	**No**	**No**	
Pinus albicaulis	Whitebark Pine	C	**No**	**No**	
Mustela nigripes	Black-footed Ferret	LE	**No**	**Un-Likely**	**LN 14-21, LN 14-19, TES 16-2**
Ursos arctos horribilis	Grizzly Bear	LT	**No**	**No**	
Lewis and Clark County					
Ursus arctos horribilis	Grizzly Bear	**LT**	**Possible**	**Yes**	**CSU 12-12, TES 16-2**
Lynx canadensis	Canada Lynx	**LT, CH**	**No**	**No**	
Salvelinus confluentus	Bull Trout	**LT, CH**	**No**	**No**	

County/Scientific Name	Common Name	Status	Species Present in Lease Parcels	Suitable Habitat Present in Lease Parcels	If species and/or habitat are present, identify stipulations that would avoid/minimize impacts to the species.
Calidris canutus rufa	Red Knot	**LT**	**No**	**No**	
Gulo luscus	Wolverine	P	**No**	**No**	
Pinus albicaulis	Whitebark Pine	C	**No**	**No**	
Beaverhead County					
Lynx canadensis	Canada Lynx	LT	**No**	**No**	
Ursos arctos horribilus	Grizzly Bear	LT	**No**	**Yes**	Suitable habitat exists in parcel MTM 105431-GM, however grizzly bears are not present in this parcel at this time, but could be transient.
Gulo gulo luscus	North American Wolverine	P	**No**	**No**	
Madison County					
Lynx canadensis	Canada Lynx	**LT**	**No**	**No**	
Calidris canutus rufa	Red Knot	**LT**	**No**	**No**	
Gulo luscus	Wolverine	P	**No**	**No**	
Pinus albicaulis	Whitebark Pine	C	**No**	**No**	
Spiranthes diluvialis	Ute Ladies' Tresses	**LT**	**No**	**Yes**	**TES 16-2**
Ursos arctos horribilus	Grizzly Bear	**LT**	**No**	**No**	
Blaine County					
Scaphirhynchus albus	Pallid Sturgeon	LE	No	No	
Mustela nigripes	Black-footed Ferret	LE	No	No	
Charadrius melodus	Piping Plover	LT, CH	No	No	
Glacier County					
Ursus arctos horribilis	Grizzly Bear	LT	No	No	
Lynx canadensis	Canada Lynx	LT, CH	No	No	

County/Scientific Name	Common Name	Status	Species Present in Lease Parcels	Suitable Habitat Present in Lease Parcels	If species and/or habitat are present, identify stipulations that would avoid/minimize impacts to the species.
Salvelinus confluentus	Bull Trout	LT, CH	No	No	
Gulo luscus	Wolverine	P	No	No	
Lednia tumana	Meltwater Lednian Stonefly	P	No	No	
Zapada glacier	Western Glacier Stonefly	P	No	No	
Pinus albicaulis	Whitebark Pine	C	No	No	
Toole County					
Calidris canutus rufa	Red Knot	LT	No	Unlikely	CSU 12-25
Ursus arctos horribilis	Grizzly Bear	LT	No	No	
Pinus albicaulis	Whitebark Pine	C	No	No	
Valley County					
Scaphirhynchus albus	Pallid Sturgeon	LE	No	No	
Charadrius melodus	Piping Plover	LT, CH	No	No	
Calidris canutus rufa	Red Knot	LT	No	No	
Sterna antillarum athalassos	Interior Least Tern	LE	No	No	
Grus americana	Whooping Crane	LE	No	No	
Custer County					
Scaphirhynchus albus	Pallid Sturgeon	LE	No	No	
Sterna antillarum athalassos	Interior Least Tern	LE	No	No	
Grus americana	Whooping Crane	LE	No	No	
Myotis septentrionalis	Northern Long-eared Bat	LT	Un-Likely	Un-Likely	TES 16-2
Dawson County					

County/Scientific Name	Common Name	Status	Species Present in Lease Parcels	Suitable Habitat Present in Lease Parcels	If species and/or habitat are present, identify stipulations that would avoid/minimize impacts to the species.
Scaphirhynchus albus	Pallid Sturgeon	LE	Yes	Yes	NSO 11-78 (two parcels, HX HY) TES 16-2
Sterna antillarum athalassos	Interior Least Tern	LE	Yes	Yes	NSO-11-76 (one parcel, HY) TES 16-2
Grus americana	Whooping Crane	LE	No	No	
Charadrius melodus	Piping Plover	LT	No	No	
Myotis septentrionalis	Northern Long-eared Bat	LT	Un-Likely	Un-Likely	TES 16-2
Roosevelt County					
Scaphirhynchus albus	Pallid Sturgeon	LE	No	No	
Charadrius melodus	Piping Plover	LT, CH	No	No	
Sterna antillarum athalassos	Interior Least Tern	LE	No	No	
Grus americana	Whooping Crane	LE	Un-Likely	Un-Likely	TES 16-2
Calidris canutus rufa	Red Knot	LT	No	No	
Myotis septentrionalis	Northern Long-eared Bat	LT	No	No	
Fallon County					
Grus americana	Whooping Crane	LE	No	No	
Myotis septentrionalis	Northern Long-eared Bat	LT	No	No	
Charadrius melodus	Piping Plover	LT, CH	No	No	
Big Horn County					
Mustela nigripes	Black-footed Ferret	LE	No	No	
Sheridan County					
Charadrius melodus	Piping Plover	LT, CH	No	No	
Grus americana	Whooping Crane	LE	Un-Likely	Un-Likely	TES 16-2

County/Scientific Name	Common Name	Status	Species Present in Lease Parcels	Suitable Habitat Present in Lease Parcels	If species and/or habitat are present, identify stipulations that would avoid/minimize impacts to the species.
Sterna antillarum athalassos	Interior Least Tern	LE	No	No	
Calidris canutus rufa	Red Knot	LT	No	No	
Rosebud County					
Sterna antillarum athalassos	Interior Least Tern	LE	No	No	
Scaphirhynchus albus	Pallid Sturgeon	LE	No	No	
Grus americana	Whooping Crane	LE	No	Un-Likely	TES 16-2

C = Candidate PCH = Proposed Critical Habitat LT = Listed Threatened CH = Designated Critical Habitat LE = Listed Endangered P = Proposed XN = Experimental non-essential population

VISUAL RESOURCES: BLM is required to manage for visual resources on BLM own surface lands. Each RMP contains VRM requirements and considerations specific for the geographical location to which they apply. VRM practices and standards will be implemented consistent with the respective RMP they are subject to. New oil and gas development would implement, as appropriate for the site, BMP's to maintain visual qualities where possible. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. The application of Standard Lease Stipulation 16-3 would be sufficient at the leasing stage to notify operators that additional measures may be necessary to reduce visual impacts from potential future development (at the APD stage). This provides for the protection and conservation of the visual resources on public lands. BLM visual resource classifications are only applied to BLM surface. For non-federal surface lands where there are federal minerals (commonly referred to as split estate), BLM does not have the authority to manage for VRM.

RECREATION: No direct impacts to recreational opportunities would occur as a result of offering leases for sale. The leasing action would be considered in compliance with all relevant recreation regulations, protocols and policies. Impacts on recreation from potential future exploration and development would be analyzed at the APD stage and included design features, and mitigation would be integrated to reduce, avoid, or minimize potential impacts to recreation consistent with the RMP for the respective planning area.

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

Introduction

This EA considers the effects of three alternatives: Alternative A – No Action, Alternative B, and Alternative C - proposed Action. The Proposed Action is based upon EOIs that were submitted to the BLM for the December 2018 oil and gas lease sales. In addition, the BLM nominated three parcels BLM (parcel KD in Havre FO, HQ in Glasgow FO, and JF in Miles City FO) because existing wells may be draining federal minerals or for various other legal obligations.

Alternatives Considered but Eliminated

The public submitted expressions of interest for 14 parcels in the Lewistown Field Office in Meagher and Petroleum Counties) that were deferred. Although the JVP RMP was approved in 1994 to guide management of all resources in the LFO, it did not make any specific decisions relative to leasing of fluid minerals; this was due to a protest on the 1992 Final JVP RMP/EIS. Since that time, the LFO has deferred fluid mineral leasing of nominated parcels that would require special stipulations to protect important wildlife values. This deferral would continue until a new RMP is completed for the planning area.

The public submitted expressions of interest for three parcels in the Billings Field Office (2 in Carbon County and 1 in Sweet Grass County) and for one parcel in the Butte Field Office in Park County that lie along the Absaroka Beartooth Front, where parcels were deferred in the March 2018 MT/Dakotas sale pending further review of the Billings and Butte RMPs to provide the appropriate level of protection for this area. Consistent with the March 2018 deferrals, all proposed parcels that lie within this area are also being deferred (generally south of I-90 from Livingston to Red Lodge).

The Dillon and Glasgow Field Offices previously deferred 25 parcels that provide sage-grouse habitat from previous sales consistent with the prioritization objective and guidance provided in the IMs (16 parcels in the Dillon Field Office and 9 parcels in the Glasgow Field Office). The Montana/Dakotas BLM December 2018 lease sale is now carrying forward all parcels in sage-grouse habitat that were previously deferred, and has identified applicable stipulations (NSO, CSU, or TL) to avoid and minimize impacts. Both the BLM and the State of Montana have stipulations in place to avoid/minimize impacts to sage-grouse habitat, and there is no longer a demonstrated need to defer these parcels.

Alternative A (No Action)

In the case of a lease sale the No Action alternative would mean that all expressions of interest to lease (parcel nominations) would not be offered for sale.

The No Action Alternative would exclude all parcels, from the competitive oil and gas lease sale. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the federal or state treasuries from the parcel lands. The No Action Alternative would result in the continuation of the current land and resource uses on the lease parcels, and would remain the same as the affected environment described in Chapter 3, as well as in the applicable ARMPs, with the exception of economics as noted below.

Alternative B (Proposed Action)

The Proposed Action Alternative would be to offer 101 lease parcels and part of one additional parcel encompassing approximately 69,270 Federal mineral acres located across the MT/Dakotas BLM, to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on December 11,

2018 (Refer to Table 1) in conformance with the existing land use planning decisions. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Appendix B has description of Lease Stipulations. Maps (Appendix C) indicate the detailed location of each parcel.

The terms and conditions of the standard federal lease and federal regulations would apply to the parcels offered for sale in the Proposed Action. Stipulations shown in Appendix A would be included with the identified parcel offered for sale. Standard operating procedures for oil and gas development include measures to protect the environment and resources such as groundwater, air, wildlife, cultural resource concerns, and others specified in the respective RMP for each planning area.

Lease stipulations would be attached to the parcels to address site specific concerns or new information not previously identified in the land use planning process. Once sold, the lease purchaser would have the right to use as much of the leased lands as is reasonably necessary to explore and drill for all of the oil and gas within the lease boundaries, subject to the stipulations attached to the lease (43 CFR 3101.1-4).

Conditions of Approval (COAs) would be attached to permits issued to explore and develop the parcels to address site specific concerns or new information once an APD is analyzed in future NEPA documents. Standard operating procedures, best management practices (BMPs), and COAs can change over time to meet RMP objectives, resource needs or land use compatibility.

A Federal oil and gas lease would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10-year period, does not make annual rental payments, or does not comply with the terms and conditions of the lease, the BLM would terminate the lease. The lessee can relinquish the lease. The oil and gas resources could be offered for sale at a future lease sale.

Drilling of wells on a lease would not be permitted until the lessee or operator secures approval of a drilling permit and a surface use plan as specified in 43 CFR 3162. This requires additional environmental reviews, by the BLM, at the time of application.

For the split-estate lease parcels, the BLM would provide courtesy notification to private landowners that the Federal oil and gas estate under their surface will be included in this lease sale.

Prior to approval of the APD, (or Sundry Notice to conduct new surface disturbing activities), the operator must certify as part of the complete application that it has made a good faith effort to reach an agreement with the private surface owner. If the surface owner and operator fail to reach an agreement, the operator must file a bond (determined by BLM, minimum of $1,000) with BLM for the benefit of the surface owner to cover compensation for reasonable and foreseeable loss of crops and damages to tangible improvements. The BLM will advise the surface owner of appeal rights and will review the value of the bond if the surface owner appeals.

Alternative C

During public comment, the BLM received comments from MT FWP identifying a need to conserve existing sage-grouse habitat around leks in close proximity to specific parcels. The BLM reviewed the location of active leks near the parcels identified by MT FWP, and identified an active lek near Parcels MTM 105431 GD, GG, and GH that lies outside the boundaries of sage-grouse habitat designated by the BLM in the 2015 ARMP, and by the State of Montana (core or general habitat). The three lease parcels are located in designated PHMA or GHMA but the lek is not. These three parcels are located within the 3.1-mile buffer of this lek. As the parcels are located in PHMA and GHMA, they have restrictions in place that limit development. However, the immediate area surrounding the active lek lacks stipulations to

conserve the habitat. A NSO stipulation in place in designated PHMA on the proposed parcels could inadvertently push development closer to the unprotected lek. Under Alternative C, the BLM would defer Parcels GD, GG, and GH pending additional analysis to determine the appropriate level of protection for this area. The three parcels encompass 3,065 acres in Beaverhead County.

In response to ongoing litigation related to implementation of BLM Instruction Memorandum 2018-034 (*Western Watersheds Project v. Zinke*, No. 1:18-cv-00187-REB (D. Idaho Sept. 21, 2018), the BLM would not offer any parcels in designated sage-grouse habitat in the December 2018 oil and gas lease sale. Seventy-six parcels encompassing 54206.5 acres would be eliminated from the December 2018 sale under Alternative C, but could potentially be offered in a subsequent sale.

With the deferral of the three sage-grouse parcels in Dillon, and removal of 76 sage-grouse habitat parcels impacted by litigation, the BLM would offer 23 parcels as part of a competitive oil and gas lease sale under Alternative C. The 23 nominated parcels encompass 12,517 Federal mineral acres in Park, Blaine, Toole, Glacier, Dawson, Sheridan, Roosevelt and Big Horn Counties in Montana (Butte, Havre, and Miles City Field Offices). Refer to Table 3 below.

Other facets of the Oil and Gas Lease Sale, tentatively scheduled for December 11, 2018 remain the same as that described under the Proposed Action. Appendix A has been updated to include Alternative C.

Table 3: December 2018 Oil and Gas Lease Sale – Parcels Carried Forward that are not in designated Sage-Grouse Habitat

# Parcels	Field Office	Parcel Number	County	Acres
1	Butte	MTM 79010-S1	Lewis and Clark	1463.26
2	Havre	MTM 108952-H3	Blaine	639.64
3		MTM 108952-G9	Blaine	4.0
4		MTM 108952-H7	Blaine	50.26
5		MTM 108952-J4	Toole	1000.17
6		MTM 108952-J6	Toole	1182.92
7		MTM 108952-J7	Toole	185.76
8		MTM 108952-J8	Toole	913.02
9		MTM 108952-J9	Toole	1156.86
10		MTM 108952-KF	Toole	202.14
11		MTM 108952-KE	Toole	320.0
12		MTM 108952-KT	Glacier	482.87
13		MTM 108952-KU	Glacier	7.28
14	Miles City	MTM 108952-JX	Dawson	712.66
15		MTM 108952-KA	Dawson	320.0
16		MTM 108952-HX	Dawson	107.01
17		MTM 108952-HY	Dawson	138.56
18		MTM 108952-H9	Dawson	1397.29
19		MTM 108952-HD	Sheridan	120.0
20		MTM 108952-H6	Roosevelt	79.76
21		MTM 108952-HG	Big Horn	854.49
22		MTM 108952-HH	Big Horn	1153.45
23		MTM 108952-HQ	Big Horn	25.85
Total				12517.25

CHAPTER 3 - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

Introduction

This chapter describes the affected environment (i.e., the physical, biological, and socioeconomic values and resources) and environmental consequences to resources that could be affected by implementation of the proposed action. This analysis is tiered to the respective RMP for each geographic location of the nominated parcels and the analysis of direct, indirect, and cumulative effects of oil and gas development contained in those RMP's are incorporated by reference into this analysis.

Each RMP determined which areas are available for oil and gas leasing and under what conditions those leases would be offered and sold. All of the lease parcels included in the proposed action are within areas that are open to oil and gas leasing in their respective RMP.

Analysis of the lease parcels is documented in this EA, and was conducted by resource specialists in each planning area who relied on professional knowledge of the areas involved, review of current databases, file information, and prior site visits to ensure that appropriate stipulations were recommended for each parcel.

Unless otherwise noted in the analysis of a specific resource, the analysis areas are geographically defined in Table 1.

The temporal scale of effects includes the 10-year period of a lease term, unless the lease is held by production, in which case the temporal scale is extended to the life of the producing well. If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years.

Effects of the Proposed Action

The act of leasing parcels would not cause direct effects to resources because no surface disturbance would occur. The only direct effects of leasing are the creation of valid existing rights and impacts related to revenue generated by the lease sale receipts.

Future lease exploration and development activities proposed through individual APD submission will be subject to future BLM decision-making and NEPA analysis. The BLM assumes there is a high interest in development of any leased parcels but, even if lease parcels are leased, it is uncertain whether development would actually occur. Therefore, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. This analysis assumes wells would be developed based upon information described in the Reasonable Foreseeable Development Scenario described below.

Upon receipt of an Application for a Permit to Drill (APD), the BLM would initiate a site-specific NEPA analysis that considers the direct, indirect, and cumulative effects of a specific action. At this time, detailed information about proposed wells and facilities would be provided for particular leases. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify Conditions of Approval (COAs), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use

rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

Overall impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the related FEIS/RMP for each planning area. The lease parcels being analyzed in this EA are designated open to oil and gas leasing with appropriate stipulations.

Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the applicable FEIS for each Field Office, which are incorporated by reference into this EA. The RFD contains the number of potential oil and gas wells that could be drilled and produced by field office for Alternatives B and C, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. An estimate of the number of wells that could be drilled as well as acres of surface disturbance are summarized in Table 4 below. Comprehensive RFD discussions for each planning area are included in Appendix D.

Table 4: Summary of Estimated Reasonably Foreseeable Development (RFD) Scenario and Acres of Surface Disturbance for the December 2018 Lease Sale

Field Office	County	BLM Surface (acres)	Private Surface (acres)	Other (acres)	Development Potential	RFD (Est # of well)	Estimated Acres Surface Disturbance Short / Long-term
Billings	Carbon	3761.66	40		6 parcels moderate All /part of 2 parcels 842 acres) deferred	20 wells (estimate 2 wells per year)	70-110 ST 35-110 LT
	Musselshell	2960.29	989.48		7 parcels moderate		
	Sweet Grass			75.37	None; deferred	0 wells	0
Butte	Lewis & Clark		1463.26		1 parcel moderate/Low	2 wells	55.6 ST
	Park	50.27	320	392.11	None; Deferred	0 wells	0
Dillon	Beaverhead	8769.97	3720.36		4 parcels very low, 9 low, 1 moderate	1	65.4 ST
	Madison		398.69		1 parcel very low		
Glasgow	Valley	10717.32	635.02		10 parcels very low	4 - 5 wells	20.8 – 26 ST 3.7 – 4.6 LT
Havre	Blaine	1705.19	54.26		4 parcels low, 2 moderate		
	Glacier		453.75	36.40	2 parcels low		
	Toole	1817.78	3143.09		2 parcels very low, 5 low		
Lewistown	Meagher		3082.68		None; 6 parcels deferred	0 wells	0
	Petroleum	1180.51	1580.12		None; 8 parcels deferred	0 wells	0
Miles City	Big Horn	1141.98	5851.65		15 parcels medium	3 - 4 oil wells 4 - 5 gas wells	16.8 – 22.0 ST 6.3 – 8.3 LT
	Custer	320 acres	320		1 parcel low		
	Dawson	1424.55	1370.97		6 parcels medium		
	Fallon	1839			4 parcels low		
	Roosevelt		79.76		1 parcel high		
	Rosebud	12178.30	4757.61		12 parcels medium, 9 parcels low		
	Sheridan		120		1 parcel high		
North Dakota	Bowman	40.0			1 parcel very high	1 well	1.1 ST .55 LT
Total						35 - 38	229 ST

Methodology and Analytical Assumptions

The effects analysis is based on scientific literature, professional judgment, experience, and field visits. This analysis is organized by resource issues where the projected effects from implementing alternatives are described. The analysis focuses on the resource impact indicator(s) identified for each resource issue in Chapter 1.

Resource Issue 1: Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources. Air resource impacts are affected by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Affected Environment

Ambient air quality in a given location may be characterized by comparing the concentration of various pollutants in the ambient air with the standards set by federal and state agencies. Under the authority of the Clean Air Act (CAA), the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS) for six air pollutants. The standards set maximum allowable atmospheric concentration of these six criteria pollutants and were established to protect the public health within an adequate margin of safety. The Montana Department of Environmental Quality (MDEQ) and the North Dakota Department of Health, Division of Air Quality (NDDOH) have also adopted and established state ambient air quality standards (MAAQS and NDAAQS). Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM10 and PM2.5), ozone (O3), sulfur dioxide (SO2), and lead.
Two additional pollutants of concern, nitrogen oxides (NOx) and volatile organic compounds (VOCs) are also regulated because they contribute to the formation of ozone in the atmosphere, however no NAAQS or MAAQS have been established for these pollutants. Additionally, greenhouse gases (GHGs) became regulated pollutants on January 2, 2011 because of their contribution to global climate change effects. Many air quality permitting and regulation activities under the CAA are delegated to the state and MDEQ has also established permitting and registration requirements as well as emission standards for equipment involved in oil and gas development.

The area managed by the BLM field offices where the parcels for this lease sale are proposed, is in compliance with all NAAQS. Oil and gas development can result in emissions that can affect ambient concentrations of particulate matter, ozone, and nitrogen oxides from construction and production activities and in some fields, concentrations of sulfur dioxide can be affected. Hazardous air pollutants (HAPS) may also be emitted from oil and gas operations, including well drilling, well completion, and venting. However, no ambient standards have been established for the HAPS associated with oil and gas development in the proposed leasing area and ambient monitoring data for HAPs is not available.

The EPA air quality index (AQI) is an index used for reporting daily air quality to the public (https://www.airnow.gov/). The AQI index is one way to generally evaluate how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates a daily AQI based on local air monitoring data. The term "Good" helps to interpret the AQI. When the AQI value is between 0 and 50, air quality is considered satisfactory and air pollution poses little or no risk. Air monitoring data and daily AQIs are available within or near the proposed areas for leasing in the counties shown in Table 1. AQI data show air quality is good within the analysis area and that there is little risk to

the general public from poor air quality based on available data for the most recent 3 year period (2015-2017), Table 5, and at least 77 percent of the days were rated "good" over the three year period.

Table 5. Air Quality Index Data 2015-2017

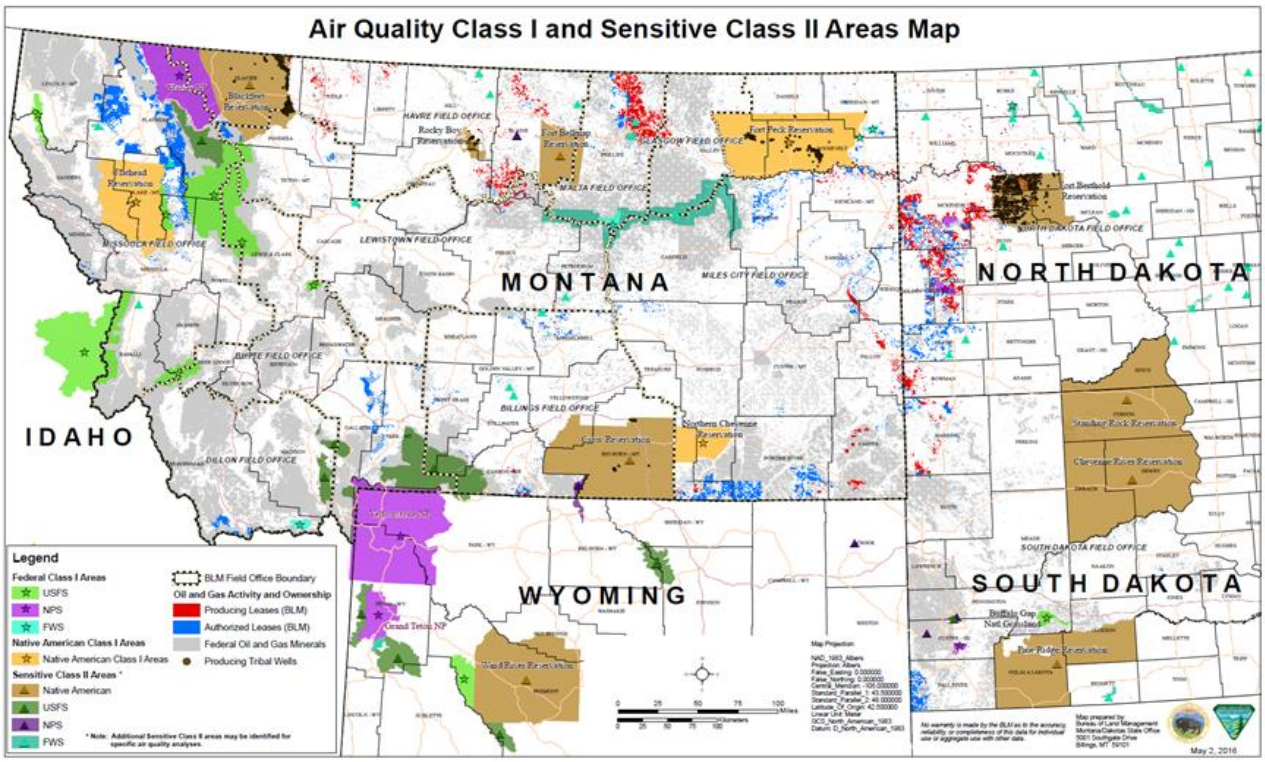
County	Days in Period	Days Rated Good	% Days Rated Good	Days Rated Moderate	Days Rated not healthy[1]
Lewis&Clark County, MT	1096	843	77%	204	20
Rosebud County, MT	1096	921	84%	150	25
Sheridan County, MT	310	300	97%	7	3
Theo Roosevelt NP, ND	1093	1001	92%	86	6

1 includes days rated unhealthy for sensitive groups, unhealthy, and very unhealthy
Source: EPA Air Data (EPA 2018) https://www.epa.gov/outdoor-air-quality-data

Air Quality Related Values

Air resources also encompass Air Quality Related Values (AQRVs) which are resources that are sensitive to air quality and include aesthetic values such as visibility and biological and terrestrial resources such as vegetation, soils, water, and wildlife. Air pollution can impact AQRVs through ambient exposure to elevated atmospheric concentrations, such as O3 effects to vegetation, impairment of scenic views by pollution particles in the atmosphere, and deposition of air pollutants, such as sulfur and nitrogen compounds, on the earth's surface through precipitation or dry deposition. AQRVs on federal lands are identified and managed within the respective jurisdictions of several land management agencies in designated Class I areas. Class I areas are afforded specific AQRV protection under the Clean Air Act. Figure 1 shows the Class I areas located in the analysis area for this proposed lease sale. Existing conditions related to AQRVs have been described in the Miles City, Billings, and HiLine Resources Management Plans and the reader is referred to these plans for additional background information.

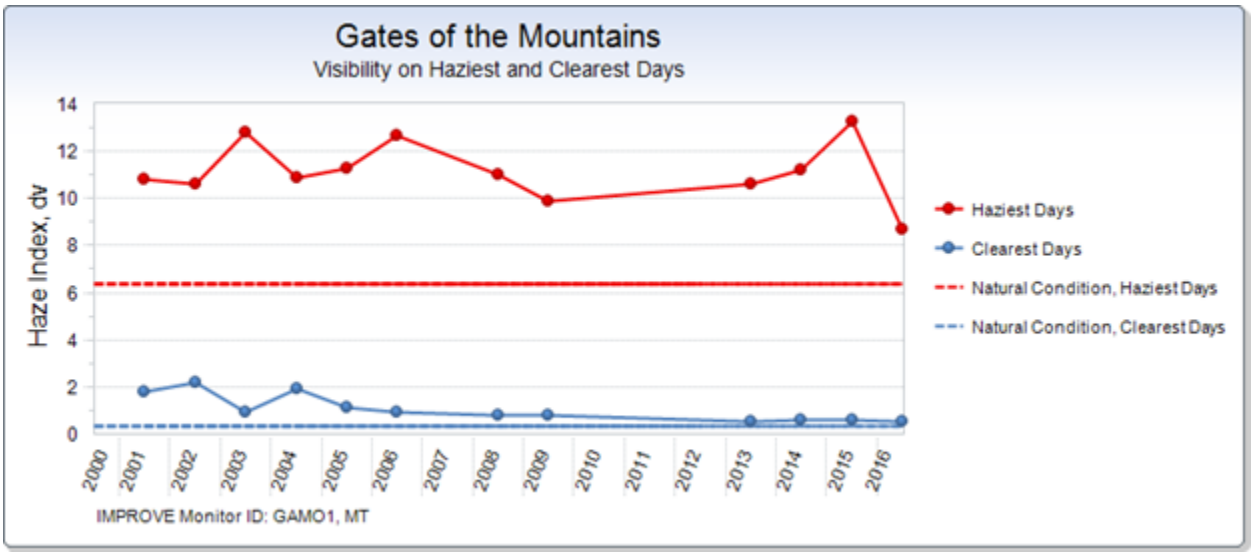
Figure 1: Air Quality Class I Areas



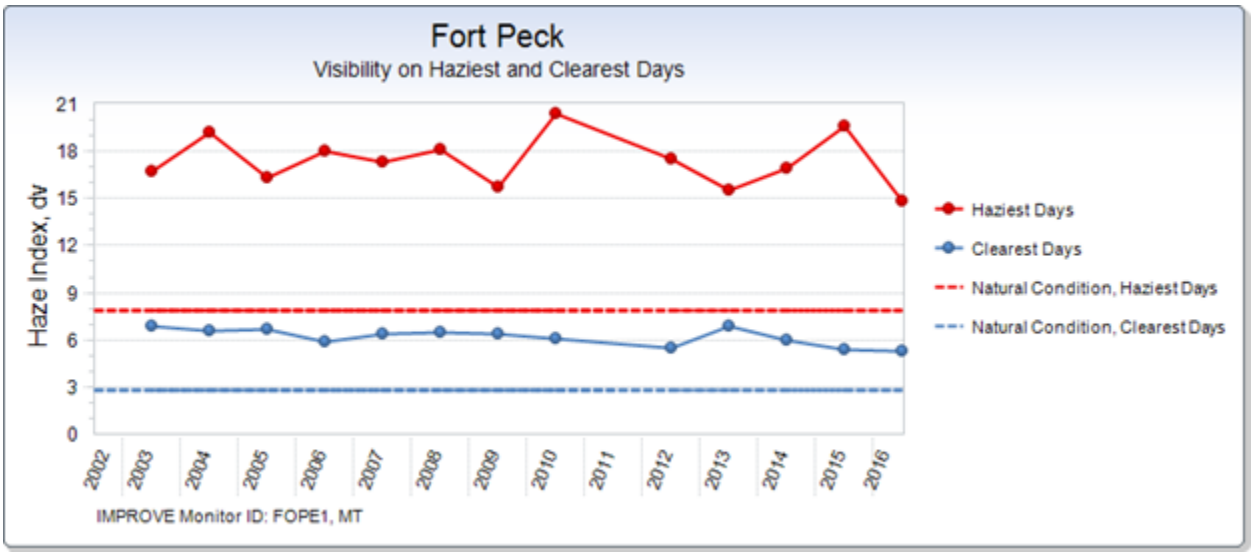
Pollutant particles in the atmosphere can impair scenic views, degrading the contrast, colors, and distance an observer is able to see. Visibility is a measure of how far and how well an observer can see a distant and varied scene and can be assessed in terms of the distance that a person can distinguish a large dark object on the horizon and is measured as the standard visual range in miles. A deciview is a unit of measurement to quantify human perception of visibility. It is derived from the natural logarithm of atmospheric light extinction coefficient. One (1) deciview is roughly the smallest change in visibility (haze) that is barely perceptible. Because visibility at any one location is highly variable throughout the year, it is characterized by three groupings: the clearest 20% days, average 20% days, and haziest 20% days.

Visibility degradation is primarily due to anthropogenic sulfate, nitrate, and particulate emissions and due to wildfires. Air pollutants affecting visibility can be transported hundreds of miles. Some of the proposed parcels are within 50 kilometers (km) (approximately 30 miles) of a Class I area and if developed, emissions could potentially impact visibility and result in atmospheric deposition. Proposed parcels within the Butte Field Office are within 50 km of the Gates of the Mountains Wilderness Area and the Scapegoat Wilderness Area. Proposed parcels within the Billings Field Office are within 50 km of the North Absaroka Wilderness Area. Proposed parcels within the Glasgow Field Office are within the Fort Peck Tribal Class I area and proposed parcels within the Miles City Field Office are within 50 km of the Northern Cheyenne Tribal Class I area. Figure 2 shows current visibility trends at some of the Class I areas that could potentially be impacted from development on proposed parcels.

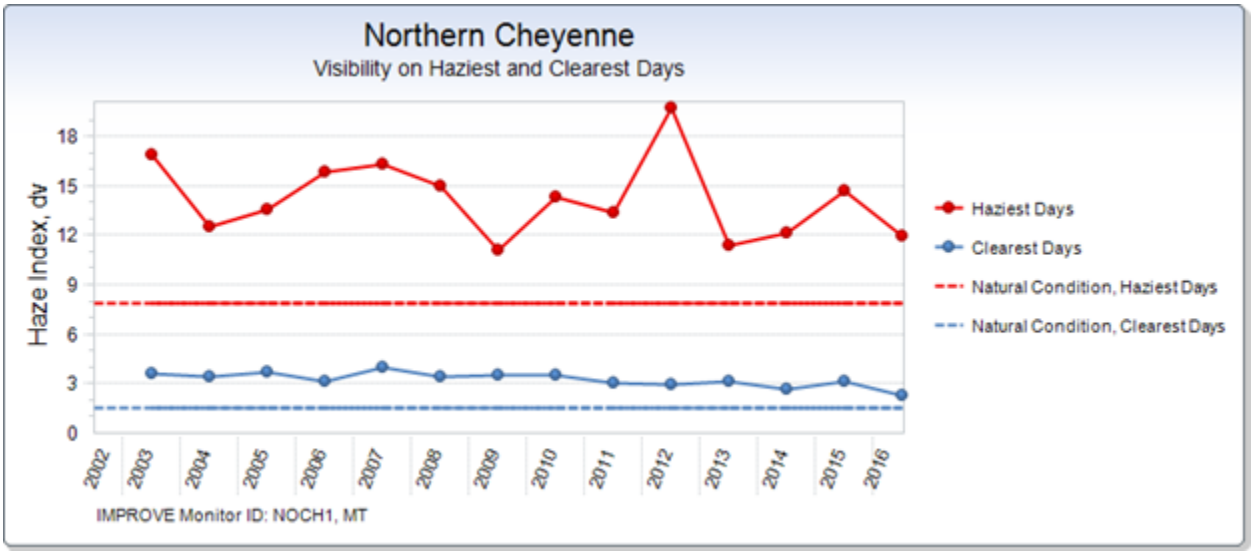
Figure 2: Visibility Trends at Class I Areas



Source: IMPROVE 2018. http://vista.cira.colostate.edu/Improve/data-page/



Source: IMPROVE 2018. http://vista.cira.colostate.edu/Improve/data-page/



Source: IMPROVE 2018 http://vista.cira.colostate.edu/Improve/data-page/

Atmospheric deposition occurs when gaseous and particulate air pollutants are deposited on the ground, water bodies or vegetation. The pollutants may settle as dust or be washed from the atmosphere in rain, fog, or snow. When air pollutants such as sulfur and nitrogen are deposited into ecosystems, they may cause acidification, or enrichment of soils and surface waters. Atmospheric nitrogen and sulfur deposition may affect water chemistry, resulting in impacts to aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Although nitrogen is an essential plant nutrient, excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others. Information on wet and dry deposition at Class I areas within the analysis area can be found at EPA's Clean Air Status and Trends Network monitoring program at https://www.epa.gov/castnet/castnet-site-locations.

Climate and Climate Change

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years such as temperature and precipitation. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC, 2013).

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse

gases have increased" (IPCC, 2013). The global average surface temperature has increased approximately 1.5°F from 1880 to 2012 (IPCC, 2013). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth).

Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. The buildup of GHGs such as CO2, methane, N2O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

Each GHG has a global warming potential (GWP) that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere. GWP values allow for a comparison of the impacts of emissions and reductions of different gases. According to the IPCC, GWPs typically have an uncertainty of ±35 percent. GWPs have been developed for several GHGs over different time horizons including 20 year, 100 year, and 500 year. The choice of emission metric and time horizon depends on type of application and policy context; hence, no single metric is optimal for all policy goals. The 100-year GWP (GWP100) was adopted by the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol and is now used widely as the default metric. In addition, the EPA uses the 100 year time horizon in its *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2016* (April 2018), GHG Reporting Rule requirements under 40 CFR Part 98 Subpart A, and uses the GWPs and time horizon consistent with the IPCC Fifth Assessment Report, Climate Change Synthesis Report, 2014 in its science communications. In this EA, the BLM uses GWPs and time horizon consistent with EPA in its GHG emission calculations associated with the proposed action. BLM has also included a comparison of GHG emissions using the 20 year time horizon for illustrative purposes.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years.

In Montana's northeastern region, where most of the proposed parcels are located, temperatures and precipitation have been increasing from 1895-2017 (NOAA, 2018). The 2017 Montana Climate Assessment (Whitlock, 2017) is a report providing information on present-day climate as well as climate terminology, past climate trends, and future climate projections within Montana. Major findings from this report include:

- Annual average temperatures, including daily minimums, maximums, and averages, have risen across the state between 1950 and 2015. The increases range between 2.0-3.0°F,

- Average winter precipitation decreased by 0.9 inches, which can largely be attributed to natural variability and an increase in El Niño events, especially in the western and central parts of the state. A significant increase in spring precipitation (1.3-2.0 inches) also occurred during this period for the eastern part of the state.

- Montana is projected to continue to warm in all geographic locations, seasons, and under all emission scenarios throughout the 21st century. By mid-century, Montana temperatures are projected to increase by approximately 4.5-6.0°F.

In North Dakota, annual average temperatures have been steadily increasing between 1901 and 2016 from 40.1ºF to 44.4ºF statewide. Statewide precipitation has increased slightly from the mean of 17.55 inches during that timeframe but regional precipitation has become wetter in some areas and drier in others (NOAA, 2017).

Environmental Impacts - Alternative A No Action

The No Action would be expected to have minimal impact on air resources compared to the proposed action. If the parcels would not be leased and potential development on the proposed parcels would not occur, then no increase in estimated emissions would be expected from potential oil and gas development.

Environmental Impacts - Alternative B

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality would occur if and when the leases are developed for oil and gas activities. The following paragraphs discuss the type of air emissions that could be expected from future oil and gas development as a result of the proposed lease sale if the parcels are leased and developed in the future including quantified estimates of potential downstream emissions of greenhouse gases (GHG) emissions and the possible relationship to climate change. In addition, the direct, indirect, and cumulative impacts from oil and gas development on air resources are analyzed in the associated Proposed Resource Management Plan and Final EIS for the Miles City field office, Billings field office, Glasgow field office, and Havre field office.

It is important to note that at the leasing stage, there is a degree of speculation and uncertainty with regard to the amount of air pollutant emissions (including GHGs) that could occur since specific design details are not yet known. The type of petroleum product, depth of geologic play, drilling and completion methodology, equipment and vehicle make, model, engine size, project acreage, and construction plans are among several variables required to generate meaningful emissions estimates. These factors determine the intensity, duration, and characteristics of associated pollutants. Therefore, the BLM may conduct additional analysis for air quality at the APD stage if development is proposed in the future on any of the lease parcels proposed for this sale. In addition, Lease Notice (LN 14-18) would be applied to all parcels included in this proposed lease sale for conservation of air resources and Controlled Surface Use stipulation CSU 12-23 would be applied to all parcels in the Miles City, Billings, Glasgow, and Havre field offices.

Air Pollutant and GHG Emissions

Oil and gas development can result in emissions that affect ambient concentrations of particulate matter, ozone, and nitrogen oxides from construction and production activities and in some fields, concentrations

of sulfur dioxide can be affected. Hazardous air pollutants (HAPs) may also be emitted from oil and gas operations, including well drilling, well completion, and venting. However, no ambient standards have been established for HAPs associated with oil and gas development in this area and ambient monitoring data is not available.

Oil and gas production sources have the potential to release air pollutant emissions that contribute to ozone formation, regional haze, atmospheric deposition, or contribute to increased global concentration of GHGs. Air pollutants such as VOCs and HAPs may be emitted from venting, flaring, and equipment leaks. Combustion of fuels in vehicles, generators, engines, and compressors may release CO, NOx, PM10, PM2.5, SO2, VOCs, and GHGs.

The direct, indirect, and cumulative impacts from oil and gas development on air resources were analyzed in Chapter 4 of the Miles City Field Office (MCFO) Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement (BLM 2015). This analysis of air resources includes a discussion of short term and long term impacts to air quality from reasonably foreseeable oil and gas development. The MCFO RMP air analysis is being referred to in this EA as the emissions analyzed are representative of the proposed parcels and the conditions, assumptions, and methodology, and environmental effects described in the RMP air analysis are still valid.

The BLM has recently completed a regional photochemical grid modeling study for the Montana Dakotas region to determine potential impacts to air quality and AQRVs from predicted future oil and gas development across the region. This regional modeling study supplements and expands on previous modeling completed to support the MCFO RMP air analysis. The *BLM Montana Dakotas State Office Photochemical Grid Modeling (PGM) Study* (BLM 2016) analyzed potential impacts from reasonably foreseeable oil and gas development within Montana, and parts of North and South Dakota. The analysis included estimates of criteria air pollutants, hazardous air pollutants, and greenhouse gas emissions from a multitude of oil and gas development sources and scenarios. The emission sources included reasonably foreseeable oil and gas facilities and operations that could be the result of BLM actions within the Montana/Dakotas region over the next 20 years.

The results of the PGM Study are useful to refer to for this lease sale proposed action as the reasonable foreseeable development (RFD) for this lease sale is included within the scenarios analyzed in the PGM study. The results show that none of the modeling (emissions and impact) scenarios yielded values in excess of the NAAQS or state ambient air quality standards for ozone, PM2.5, PM10, SO2, NO2 or CO and impacts to air quality and public health are expected to be minimal in future years at the predicted rate of oil and gas development across the region. However, the modeling study predicted impacts to air quality related values at Class I areas in eastern Montana and western North Dakota. A portion of the predicted impacts to visibility can be attributed to future federal oil and gas development and are predicted to be in excess of 0.5 and 1.0 dv thresholds at the Theodore Roosevelt, Fort Peck and Medicine Lake Class I areas. The modeling study also predicted the potential for small impacts due to atmospheric deposition of nitrogen compounds. In response to the predicted results and concerns from federal land managers at the Class I areas, the BLM (with input from other federal and state partners) has initiated a monitoring study in the Medicine Lake, Montana area to measure key pollutants of concern over time and compare to predicted impacts.

It should be noted that the modeling study analyzed potential impacts from all reasonable foreseeable oil and gas development within the region over the next 20 years. This project would represent only a small fraction of the potential development that was included in the modeling study and would be expected to have little to no impact on air quality, visibility, or atmospheric deposition.

Table 6 shows the estimated potential air emissions for the estimated RFD for Alternative B (Appendix D) for this lease sale proposal. Calculations are based on typical development and production scenarios as estimated for the MCFO RMP air analysis. Several parcels included in this lease sale are in areas with low to very low potential for development and where little to no actual oil and gas development has occurred in the last decade or more. For parcels in those counties, zero wells, resulting in no production contributing towards emissions has been assumed. Direct emissions of GHGs have been calculated using a 100 yr GWP potential of 28 for CH_4 and 265 for N_2O in accordance with EPA's current guidance and policy. Please refer to the Climate and Climate Change Section above for a more thorough discussion of GWPs. Total estimated direct GHG emissions were also calculated using the 20 year GWP of 84 for CH_4 and 264 for N_2O. Total direct GHG emissions for the proposed action using the 20 year GWP are estimated at 0.0098 million metric tons (MMT) of CO_2 equivalents per year as compared to 0.0091 MMT/yr.

Table 6. Estimated Air Emissions from Well Development and Production

County	# of wells estimated for July Leasing EA[1]		PM_{10}		$PM_{2.5}$		NOx		SO2	
	oil	gas	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)
Miles City Field Office										
Bighorn	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Bighorn		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Custer	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Custer		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Dawson	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Dawson		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Fallon	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Fallon		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Rosebud	2		0.59	1.19	0.09	0.18	1.03	2.07	0.11	0.22
Rosebud		2	0.23	0.46	0.04	0.08	0.39	0.77	0.003	0.007
Sheridan	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Sheridan		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Havre Field Office										
Blaine	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Blaine		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Toole	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Toole		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Glacier	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Glacier		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Glasgow Field Office										
Valley	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Valley		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Billings Field Office										
Mussellshell	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Mussellshell		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Sweet Grass	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Sweet Grass		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Carbon	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Carbon		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.00
Butte Field Office										
Lewis&Clark	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Lewis&Clark		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Park	2		0.59	1.19	0.09	0.18	1.03	2.07	0.11	0.22
Park		2	0.23	0.46	0.04	0.08	0.39	0.77	0.003	0.007
Dillon Field Office										
Beaverhead	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Beaverhead		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Madison	0		0.59	0.00	0.09	0.00	1.03	0.00	0.11	0.00
Madison		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
North Dakota Field Office										
Bowman	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Bowman		0	0.23	0.00	0.04	0.00	0.39	0.00	0.003	0.00
Total Estimated Emissions:				***8.45***		***1.35***		***14.57***		***1.11***

[1] Well numbers based on RFD for this lease sale (Appendix D)

[2] Emission factors used in estimated emission calculations developed for MCFO RMP and included in the Air Resource Technical Support Document (ARTSD) for Emission Inventories, Near-Field Modeling, and Visibility Screening, October 2014.

[3] Based on a 100 year GWP for CH_4=28 and a 100 year GWP for N_2O=265

Table 6. Estimated Air Emissions from Well Development and Production (cont.)

County	# of wells estimated for July Leasing EA[1]		CO		VOC		HAPs		GHGs (CO_{2eq})	
	oil	gas	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[3] (metric tons/well)	Estimated Emissions (MMT/yr)
Miles City Field Office										
Bighorn	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Bighorn		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Custer	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Custer		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Dawson	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Dawson		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Fallon	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Fallon		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Rosebud	2		3.76	7.51	1.30	2.61	0.11	0.22	626	0.0013
Rosebud		2	1.70	3.40	0.22	0.43	0.02	0.04	262	0.0005
Sheridan	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Sheridan		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Havre Field Office										
Blaine	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Blaine		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Toole	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Toole		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Glacier	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Glacier		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Glasgow Field Office										
Valley	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Valley		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Billings Field Office										
Musselshell	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Musselshell		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Sweet Grass	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Sweet Grass		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Carbon	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Carbon		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Butte Field Office										
Lewis&Clark	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Lewis&Clark		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Park	2		3.76	7.51	1.30	2.61	0.11	0.22	626	0.0013
Park		2	1.70	3.40	0.22	0.43	0.02	0.04	262	0.0005
Dillon Field Office										
Beaverhead	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Beaverhead		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Madison	0		3.76	0.00	1.30	0.00	0.11	0.00	626	0.0000
Madison		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
North Dakota Field Office										
Bowman	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Bowman		0	1.70	0.00	0.22	0.00	0.02	0.00	262	0.0000
Total Estimated Emissions:				***56.24***		***15.43***		***1.35***		***0.0091***

[1] Well numbers based on RFD for this lease sale (Appendix D)

[2] Emission factors used in estimated emission calculations developed for MCFO RMP and included in the Air Resource Technical Support Document (ARTSD) for Emission Inventories, Near-Field Modeling, and Visibility Screening, October 2014.

[3] Based on a 100 year GWP for CH_4=28 and a 100 year GWP for N_2O=265

On January 2, 2011, the EPA began regulating GHG emissions under the Clean Air Act from mobile and stationary sources of air pollution because of their contribution to global climate change. While the leasing action itself would not generate any direct or indirect GHG emissions, the BLM recognizes that

the reasonably foreseeable consequence of leasing may be oil and gas development, and that such development could result in an increase in GHG emissions due to the post production or "downstream" uses of the petroleum products produced from these parcels. For this EA, the BLM used readily available scientific information and reasonable assumptions about product end use to estimate potential downstream emissions attributable to this lease sale. It should be noted at the outset that the BLM does not exercise control over the specific end use of the oil and gas produced from any individual federal lease and has no authority to direct or regulate the end use of the produced products. As a result, the BLM can only provide an estimate of potential GHG emissions by assuming that all produced products would eventually be combusted. The uncertainty about end uses is in addition to the uncertainty with regard to the actual levels of development and production that may occur at any given well allows for a wide range of variability in potential GHG emissions.

Table 7 shows an estimate of potential downstream GHG emissions using reasonable projections and assumptions. In this analysis it was assumed that 100% of the oil and gas that may be produced from the proposed parcels included in Alternative B would be attributed to fossil fuel combustion within the United States for residential heating and electricity. Emissions are based on average production rates within each field office and the RFD for each field office. Parcels with low to very low potential are again assumed to have no production as was the assumption for the direct air emissions calculations. Downstream/indirect GHG emissions were estimated using the 100 yr GWPs and are compared to the estimated emissions using the 20 yr GWP.

The total projected increase in downstream GHG emissions from the proposed parcels is estimated to be 0.0261 million metric tons (MMT) per year of carbon dioxide equivalents (CO2eq) if the lease parcels were sold and if they are developed and if the number of wells projected in the RFD produce oil and gas at a production rate similar to other wells in the associated fields. This quantity can be compared to total estimated downstream GHG emissions from production of the proposed parcels using 20 yr GWPs. That quantity is estimated to be 0.0263 MMT/yr.

Table 7. Estimated Downstream GHG Emissions Due to Fossil Fuel Combustion

County	# of wells estimated for July Leasing EA		Ave oil prod. Rate (BBL/day/well)	Ave. gas prod. Rate (MCF/day/well)	CO_2 Combustion emission factor (g/MMBTU)	CH_4 Combustion emission factor (g/MMBTU)	N_2O Combustion emission factor (g/MMBTU)	CO_2 Emissions (metric tons/yr)	CH_4 Emissions (metric tons/yr)	N_2O Emissions (metric tons/yr)	CO_2eq Million Metric Tons/Year (MMTY) 100 yr
	oil	gas									
Miles City Field Office											
Bighorn	1	0	21		74,000	10	0.6	3,290	0.44	0.03	0.003
Bighorn	0	1		28	53,060	1	0.1	556	0.01	0.00	0.001
Custer	0		21		74,000	10	0.6	-	-	-	0.000
Custer		0		28	53,060	1	0.1	-	-	-	0.000
Dawson	0		21		74,000	10	0.6	-	-	-	0.000
Dawson		1		28	53,060	1	0.1	556	0.01	0.00	0.001
Fallon	0		21		74,000	10	0.6	-	-	-	0.000
Fallon		0		28	53,060	1	0.1	-	-	-	0.000
Rosebud	2		21		74,000	10	0.6	6,580	0.89	0.05	0.007
Rosebud		2		28	53,060	1	0.1	1,112	0.02	0.00	0.001
Sheridan	0		21		74,000	10	0.6	-	-	-	0.000
Sheridan		1		28	53,060	1	0.1	556	0.01	0.00	0.001
Havre Field Office											
Blaine	1		6		74,000	10	0.6	940	0.13	0.01	0.001
Blaine		1		40	53,060	1	0.1	794	0.01	0.00	0.001
Toole	1		6		74,000	10	0.6	940	0.13	0.01	0.001
Toole		0		40	53,060	1	0.1	-	-	-	0.000
Glacier	0		6		74,000	10	0.6	-	-	-	0.000
Glacier		0		40	53,060	1	0.1	-	-	-	0.000
Glasgow Field Office											
Valley	0		6		74,000	10	0.6	-	-	-	0.000
Valley		1		40	53,060	1	0.1	794	0.01	0.00	0.001
Billings Field Office											
Mussellshell	1		12		74,000	10	0.6	1,880	0.25	0.02	0.002
Mussellshell		0		91	53,060	1	0.1	-	-	-	0.000
Sweet Grass	0		12		74,000	10	0.6	-	-	-	0.000
Sweet Grass		0		91	53,060	1	0.1	-	-	-	0.000
Carbon	0		12		74,000	10	0.6	-	-	-	0.000
Carbon		1		91	53,060	1	0.1	1,806	0.03	0.00	0.002
Butte Field Office											
Lewis&Clark	0		2		74,000	10	0.6	-	-	-	0.000
Lewis&Clark		1		1	53,060	1	0.1	20	0.00	0.00	0.000
Park	2		2		74,000	10	0.6	627	0.08	0.01	0.001
Park		2		1	53,060	1	0.1	40	0.00	0.00	0.000
Dillon Field Office											
Beaverhead	1		2		74,000	10	0.6	313	0.04	0.00	0.000
Beaverhead		0		1	53,060	1	0.1	-	-	-	0.000
Madison	0		2		74,000	10	0.6	-	-	-	0.000
Madison		0		1	53,060	1	0.1	-	-	-	0.000
North Dakota Field Office											
Bowman	1		33		74,000	10	0.6	5,170	0.70	0.04	0.005
Bowman		0		34	53,060	1	0.1	-	-	-	0.000
											0.0261

The estimated downstream GHG emissions increase is based on 100% of the estimated production being combusted for residential use. According to the USEPA, this estimated quantity represents approximately 0.0004% of total U.S. GHG emissions estimated in EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks for 2016 and 0.12% of the GHG emissions reported by industrial sources in in Montana in 2016. This quantity represents approximately 0.17% of the GHG emissions reported in 2016 from coal fired power plants in Rosebud county, the county with the most proposed parcels

(https://ghgdata.epa.gov/ghgp/main.do). The estimated quantity of GHG emissions from the combustion of fossil fuels that could be produced from the proposed lease sale parcels is approximately equivalent to the GHG emissions emitted from 5,588 cars in one year or the CO_2 emissions from the energy used in 2,818 homes (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator). At this time, the BLM is disclosing the likelihood and potential magnitude of downstream GHG emissions but is not able to disclose potential impacts to climate change from the estimated downstream GHG emissions related to the proposed lease sale. Analysis of impacts at this stage would be speculative and would be not be based on "reasonable projections and assumptions".

BLM Best Management Practices (BMP)

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. The North Dakota Resource Management Plan and Environmental Impact Statement, July 1987 includes the following measures for the protection of air resources:

- Flaring must be approved in writing by the BLM District Manager and be in compliance with all other provisions of Notice to Lessee-4A (NTL-4A);
- Gas may be vented or flared during emergencies, well evaluation, or initial production tests for a time period of up to 30 days or the production of 50 MMCF of gas, whichever occurs first; and
- Should air quality date from research projects, specific environmental documents, or ongoing monitoring indicate unacceptable air quality resulting from flaring, newly completed oil and gas wells will be reviewed to determine the feasibility of hook-up to a gas gathering system.

In addition, Lease Notice (LN 14-18) would be applied to all parcels included in this proposed lease sale for conservation of air resources. The lease notice states, "The lessee/operator is given notice that prior to project-specific approval, additional air resource analyses may be required in order to comply with the NEPA, FLPMA, and/or other applicable laws and regulations. Analyses may include equipment and operations information, emission inventory development, dispersion modeling or photochemical grid modeling for air quality and/or air quality related value impact analysis, and/or emission control determinations. These analyses may result in the imposition of additional project-specific control measures to protect air resources." CSU 12-23, requiring the use of Tier IV or equivalent drill engines, would be applied to all APDs issued within the Miles City, Billings, and HiLine planning areas. One or more of the following measures could be imposed at the development/APD stage if additional analysis showed the potential for significant impacts to air quality:

- Emission control equipment with minimum 95 percent volatile organic compound (VOC) control efficiency on petroleum storage tank batteries;
- Low-emitting drill rig engines, such as Tier 4 diesel engines or natural gas or electric drill rig engines;
- Gas or electric turbines for compression rather than internal combustion engines;
- Replacement of older internal combustion engines with low-emitting engines that meet EPA New Source Performance Standards;
- Water or chemical suppressant application and reduced speed limits to control fugitive dust emissions;
- Multi-well pads to reduce surface disturbance and traffic;
- Replacement of diesel-fired pump jack engines with electrified engines;
- Reinjection of waste gas into no-producing wells or other underground formations; and
- Forward looking infrared (FLIR) technology to detect fugitive VOC and methane emissions and repair leaking equipment quickly; and

- Additional technologies for reducing methane emissions as recommended by EPA's natural gas STAR program.

Environmental Impacts - Alternative C

Impacts to air quality under Alternative C would be less than under Alternative B due to the significantly fewer estimated emissions (approximately 25% of Alternative B emissions). Potential impacts to air quality and emissions estimation methods are discussed further under Alternative B. Table 8 shows the estimated potential air emissions for the estimated RFD for Alternative C (Appendix D) for this lease sale proposal. Calculations are based on typical development and production scenarios as estimated for the MCFO RMP air analysis. Direct emissions of GHGs have been calculated using a 100 yr GWP potential of 28 for CH4 and 265 for N2O in accordance with EPA's current guidance and policy. Please refer to the Climate and Climate Change Section above for a more thorough discussion of GWPs. Total estimated direct GHG emissions were also calculated using the 20 year GWP of 84 for CH4 and 264 for N2O. Total estimated direct GHG emissions for Alternative C using the 20 year GWP are estimated at 0.0025 million metric tons (MMT) of CO2 equivalents per year as compared to 0.0023 MMT/yr using 100 yr GWP.

Table 9 shows an estimate of potential downstream GHG emissions using reasonable projections and assumptions. In this analysis it was assumed that 100% of the oil and gas that may be produced from the proposed parcels included in Alternative C would be attributed to fossil fuel combustion within the United States for residential heating and electricity. Emissions are based on average production rates within each field office and the RFD for each field office. Downstream/indirect GHG emissions were estimated using the 100 yr GWPs and are compared to the estimated emissions using the 20 yr GWP.

The total projected increase in downstream GHG emissions from the proposed parcels is estimated to be 0.00382 million metric tons (MMT) per year of carbon dioxide equivalents (CO2eq) if the lease parcels were sold and if they are developed and if the number of wells projected in the RFD produce oil and gas at a production rate similar to other wells in the associated fields. This quantity can be compared to total estimated downstream GHG emissions from production of the proposed parcels using 20 yr GWPs. That quantity is estimated to be 0.00384 MMT/yr.

Table 8. Estimated Air Emissions from Well Development and Production

County	# of wells estimated for July Leasing EA[1]		PM_{10}		$PM_{2.5}$		NOx		SO2	
	oil	gas	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)
Miles City Field Office										
Bighorn		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Dawson		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Havre Field Office										
Blaine	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Blaine		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Toole/Glacier	1		0.59	0.59	0.09	0.09	1.03	1.03	0.11	0.11
Butte Field Office										
Lewis&Clark		1	0.23	0.23	0.04	0.04	0.39	0.39	0.003	0.003
Total Estimated Emissions:				***2.10***		***0.34***		***3.61***		***0.23***

Table 8 Estimated Air Emissions from Well Development and Production (cont.)

County	# of wells estimated for July Leasing EA[1]		CO		VOC		HAPs		GHGs (CO_{2eq})	
	oil	gas	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[2] (tons/well)	Estimated Emissions (tons/yr)	Emission Factor[3] (metric tons/well)	Estimated Emissions (MMT/yr)
Miles City Field Office										
Bighorn		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Dawson		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Havre Field Office										
Blaine	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Blaine		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Toole/Glacier	1		3.76	3.76	1.30	1.30	0.11	0.11	626	0.0006
Butte Field Office										
Lewis&Clark		1	1.70	1.70	0.22	0.22	0.02	0.02	262	0.0003
Total Estimated Emissions:				***14.31***		***3.48***		***0.31***		***0.0023***

Table 9. Estimated Downstream GHG Emissions Due to Fossil Fuel Combustion

County	# of wells estimated for July Leasing EA		Ave oil prod. Rate (BBL/day/well)	Ave. gas prod. Rate (MCF/day/well)	CO_2 Combustion emission factor (g/MMBTU)	CH_4 Combustion emission factor (g/MMBTU)	N_2O Combustion emission factor (g/MMBTU)	CO_2 Emissions (metric tons/yr)	CH_4 Emissions (metric tons/yr)	N_2O Emissions (metric tons/yr)	CO_2eq Million Metric Tons/Year (MMTY) 100 yr
	oil	gas									
Miles City Field Office											
Bighorn		1		28	53,060	1	0.1	556	0.01	0.00	0.000556
Dawson		1		28	53,060	1	0.1	556	0.01	0.00	0.000556
Havre Field Office											
Blaine	1		6		74,000	10	0.6	940	0.13	0.01	0.000946
Blaine		1		40	53,060	1	0.1	794	0.01	0.00	0.000795
Toole/Glacier	1		6		74,000	10	0.6	940	0.13	0.01	0.000946
Butte Field Office											
Lewis&Clark		1		1	53,060	1	0.1	20	0.00	0.00	0.000020
											0.003819

Cumulative Impacts

The act of leasing parcels would not cause direct or cumulative effects to resources because no surface disturbance would occur. The only direct effects of leasing are the creation of valid existing rights and impacts related to revenue generated by the lease sale receipts. Future lease exploration and development activities proposed through individual APD submission will be subject to future BLM decision-making and NEPA analysis. The BLM assumes there is a high interest in development of any leased parcels but, even if lease parcels are leased, it is uncertain whether development would actually occur. Therefore, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. This analysis assumes wells would be developed based upon information described in the Reasonable Foreseeable Development Scenario described in the Billings ARMP FEIS and in Section 3.2 above. Upon receipt of an Application for a Permit to Drill (APD), the BLM would initiate a site-specific NEPA analysis that considers the direct, indirect, and cumulative effects of a specific action. At this time, detailed information about proposed wells and facilities would be provided for particular leases. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify Conditions of Approval (COAs), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans. Overall impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and

associated infrastructure are described in the BFO FEIS (BLM, 2015). The lease parcels being analyzed in this EA are designated open to oil and gas leasing with appropriate stipulations.

The BLM is referring to the air analysis of direct, indirect, and cumulative impacts to air resources completed for the MCFO RMP to support the analysis completed for this EA. The BLM has recently been challenged for not having completed an analysis of downstream GHGs from cumulative oil and gas production in that RMP. Therefore, the BLM is disclosing the estimated downstream/indirect GHG emissions from the selected alternative from the RMP (Alternative E). The RMP's Alternative E included estimated production values for oil, natural gas, and coal bed natural gas wells for the 20 year life of the plan. Table 10 shows the estimated downstream/indirect emissions from combustion of all reasonably foreseeable oil and gas development within the Miles City planning area for the maximum year of production. Estimated downstream GHGs would be approximately 2.03 MMT/yr from oil and gas production estimated for the maximum year during the life of the RMP. This estimated quantity represents approximately 0.03% of total U.S. GHG emissions estimated in EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks for 2016 and 9.6% of the GHG emissions reported by industrial sources in Montana in 2016 and, approximately 13.6% of the GHG emissions reported in 2016 from coal fired power plants in Rosebud County.

Table 10. Estimated Downstream GHG Emissions for Maximum Year of Oil and Gas Production within the Miles City Planning Area

Product	Maximum Wells Producing per Year	Production Rate (BOPD / MCFD)	CO_2 Combustion emission factor (g/MMBTU)	CH_4 Combustion emission factor (g/MMBTU)	N_2O Combustion emission factor (g/MMBTU)	CO_2 Emissions (metric tons/yr)	CH_4 Emissions (metric tons/yr)	N_2O Emissions (metric tons/yr)	CO_2eq Million Metric Tons/Year (MMTY) 100 yr
Oil	417	20	74,000	10	0.6	1,306,529	177	11	1.314
Natural Gas	350	40	53,060	1	0.1	277,915	5	1	0.278
CBNG	486	45	53,060	1	0.1	434,143	8	1	0.435
									2.027

Resource Issue 2: Socioeconomic Conditions and Environmental Justice

Affected Environment

The social and economic environment of the counties containing the parcels proposed are described in detail in their associated PRMP and FEIS. This section provides updated estimates of population and minority and low income populations within the study area.

As shown on Table 11 *Percentage of Residents Belonging to Environmental Justice Populations, 2016/2017 Estimates* the 20 counties with proposed parcels were the home of 199,794 residents (U.S. Census Bureau, 2017a). Approximately 98% of this total population live in Montana. County-level population ranged from Lewis and Clark County MT (population 67,773) to Petroleum County MT (population 523).

Executive Order 12898 (Feb. 11, 1994), Federal Actions to Address Environmental Justice in Minority and Low-Income Populations states "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" Analysis requires the identification of minority populations and low-income populations that may be affected by any of the alternatives.

The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. It is important to note that minority populations, low-income populations, or Tribes may experience common effects from a project even if they do not reside in the immediate study area. EO 12898 requires Federal agencies to ensure opportunities for effective public participation by potentially affected low-income populations, minority populations, or Indian tribes. These populations are considered to be potential "environmental justice populations" of concern that should be addressed throughout the planning effort.

Minority populations as defined by Council on Environmental Quality (CEQ) guidance under the National Environmental Policy Act (CEQ 1997) include individuals in the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified where "(a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater" (CEQ 1997). Additionally, "[a] minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997).

Low-income populations are determined by the U.S. Census Bureau based upon poverty thresholds developed every year. Poverty thresholds are set by the U.S. Census Bureau. CEQ guidance does not provide specific criteria for determining low-income populations as it does for minority populations, so for this project we will use the same criteria as is being used for minority populations (50 percent or greater of the population or a population that is "meaningfully greater"). We identify low-income population and minority population percentages that are "meaningfully greater" as at least five percentage points higher than for the State of Montana.

Minority populations are identified using the U.S. Census Population Estimates program which provides estimates for the resident population by age, sex, race, and Hispanic origin at the national, state and county scales. Total minority population refers to that part of the total population which is not classified as *Non-Hispanic White Only* by the U.S. Census Bureau. By using this definition of minority population, the percentage is inclusive of Hispanics and multiple race categories and any other minority single race categories. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

Data for the identification of low-income populations is from the U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE). The SAIPE program annually produces single year poverty estimates for states, counties, and school districts. The U.S. Census Bureau suggests using SAIPE data for poverty estimates for counties or school districts, especially for areas with populations of 65,000 or less (U.S. Census Bureau, 2016b). Estimates from SAIPE and the Population Estimates program are used in federal funding allocations.

Table 11: Percentage of Residents Belonging to Environmental Justice Populations, 2016/2017 Estimates

Geography	Total Population[1]	Race Alone[1]					% Two or More Races[1]	% Hispanic[1]	% total minority[2]	Poverty Percent, All Ages[3]
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				
Montana	1,050,493	86.2%	0.5%	6.1%	0.8%	0.1%	2.5%	3.8%	13.8%	13.4%
5% points greater	--	--	5.5%	11.1%	5.8%	5.1%	7.5%	8.8%	18.8%	18.4%
Beaverhead County, Montana	9,434	90.7%	0.3%	1.6%	0.5%	0.4%	2.1%	4.5%	9.3%	14.4%
Big Horn County, Montana	13,360	27.2%	0.4%	63.3% *	0.4%	0.0%	2.8%	5.9%	72.8%	25.5% *
Blaine County, Montana	6,708	45.4%	0.3%	48.7% *	0.3%	0.0%	2.5%	2.9%	54.6%	24.3% *
Carbon County, Montana	10,696	94.3%	0.6%	1.1%	0.3%	0.1%	1.2%	2.5%	5.7%	10.3%
Custer County, Montana	11,721	91.8%	0.4%	1.8%	0.6%	0.0%	1.9%	3.4%	8.2%	11.4%
Dawson County, Montana	8,950	92.6%	0.5%	1.8%	0.5%	0.0%	1.6%	3.0%	7.4%	11.2%
Fallon County, Montana	3,009	95.3%	0.2%	0.6%	0.7%	0.2%	1.4%	1.6%	4.7%	8.5%

Geography	**Total Population[1]**	**Race Alone[1]**					**% Two or More Races[1]**	**% Hispanic[1]**	**% total minority[2]**	**Poverty Percent, All Ages[3]**
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				
Glacier County, Montana	13,640	30.9%	0.2%	62.8% *	0.3%	0.0%	2.9%	2.8%	69.1%	28.3% *
Lewis and Clark County, Montana	67,773	91.4%	0.4%	1.9%	0.7%	0.1%	2.2%	3.3%	8.6%	10.4%
Musselshell County, Montana	4,639	90.7%	0.7%	1.7%	1.6%	0.0%	1.7%	3.6%	9.3%	17.4%
Park County, Montana	16,353	93.6%	0.3%	1.0%	0.4%	0.0%	1.8%	2.9%	6.4%	11.7%
Petroleum County, Montana	523	94.6%	0.0%	1.0%	0.0%	0.0%	3.3%	1.1%	5.4%	15.1%
Roosevelt County, Montana	11,098	34.2%	0.4%	57.7% *	0.5%	0.0%	3.5%	3.7%	65.8%	23.9% *
Rosebud County, Montana	9,248	55.2%	0.4%	35.8%*	0.9%	0.0%	2.5%	5.2%	44.8%	16.6%
Sheridan County, Montana	3,469	92.0%	0.3%	1.9%	0.4%	0.0%	2.1%	3.1%	8.0%	10.6%
Geography	Total Population[1]	Race Alone[1]					% Two or More Races[1]	% Hispanic[1]	% total minority[2]	Poverty Percent, All Ages[3]
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				

Geography	Total Population[1]	Race Alone[1]					% Two or More Races[1]	% Hispanic[1]	% total minority[2]	Poverty Percent, All Ages[3]
		% White	% Black or African American	% American Indian and Alaska Native	% Asian	% Native Hawaiian and Other Pacific Islander				
Sweet Grass County, Montana	3,691	93.7%	0.4%	0.9%	0.5%	0.0%	1.9%	2.5%	6.3%	9.8%
Toole County, Montana	4,886	86.9%	1.1%	4.7%	0.6%	0.0%	2.5%	4.1%	13.1%	16.8%
Valley County, Montana	7,433	84.6%	0.3%	9.0%	0.8%	0.1%	2.4%	2.7%	15.4%	12.5%
North Dakota	755,393	84.6%	3.0%	5.1%	1.6%	0.1%	2.0%	3.7%	15.4%	10.5%
5% points greater			8.0%	10.1%	6.6%	5.1%	7.0%	8.7%	20.4%	15.5%
Bowman County, North Dakota	3,166	92.0%	0.2%	1.2%	0.1%	0.0%	0.9%	5.7%	8.0%	8.2%

[1] U.S. Census Bureau, 2017a. Table PEPSR6H: Annual Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States, States, and Counties: April 1, 2010 to July 1, 2017. U.S. Census Bureau, Population Division. Accessed July 17, 2018 from: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

[2] The term "total minority population" refers to the part of the total population which is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau. This definition is most inclusive of populations that may be considered as a minority population under EO 12898.

[3] U.S. Census Bureau, 2016b. 2016 Poverty and Median Household Income Estimates - Counties, States, and National. Release date December 2017. Accessed 7/17-2018 from http://www.census.gov/did/www/saipe/data/statecounty/data/2016.html

* Population percentage over five percentage points higher than statewide percentage for this population.

Based upon these statistics Big Horn, Blaine, Glacier, Roosevelt and Rosebud counties in Montana met one or more criteria for an environmental justice population (see Table 8. Percentage of Residents Belonging to Environmental Justice Populations, 2016/2017 Estimates). In Rosebud County MT the population of American Indians and Alaska Natives was above the threshold of 11.5% and in the other counties both the population of American Indians and Alaska Natives and the percentage of residents living in poverty were more than five percentage points above the statewide percentage of Montana residents living in poverty (13.4%).

Economic Conditions

The social and economic environment of the counties containing the parcels proposed are described in detail in their associated PRMP and FEIS. This section focuses upon economic aspects related to the potential federal oil and gas lease sales.

Mineral rights can be owned by private individuals, corporations, Indian tribes, or by local, State, or Federal Governments. Typically companies specializing in the development and extraction of oil and gas lease the mineral rights for a particular parcel from the owner of the mineral rights. Federal oil and gas leases are generally issued for 10 years unless drilling activities result in one or more producing wells. Once production has begun on a Federal lease, the lease is considered to be held by production and the lessee is required to make royalty payments to the Federal Government.

Tables 15 and 16 provide information on existing oil and gas leasing for the counties that have parcels nominated for leasing in December 2018. The leasing of these minerals supports local employment and income and generates public revenue for surrounding communities. The economic contributions of Federal fluid mineral leasing actions are largely influenced by the number of acres leased can be measured in terms of the jobs, income, and public revenue it generates. Additional details on the economic contribution of Federal fluid minerals are discussed in the RMP and FEIS covering each county.

Leasing mineral rights for the development of Federal minerals generates public revenue through the bonus bids paid at competitive lease auctions and annual rents collected on leased parcels not held by production. Nominated parcels approved for oil and gas leasing are offered by the BLM at a minimum bid rate of $2.00 per acre at the competitive lease sale. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to $1.50 an acre for the first five years and $2.00 an acre for the second five years of the lease. Additionally, Federal oil and gas production in Montana is subject to production taxes or royalties. The Federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1).

As shown in Table 12 Bonus Bid and Rental Payments for Oil and Gas Leases on Non-Indian Federal Mineral Estates (2017) federal oil and gas leases on federal non-Indian properties located in the counties covered in this EA produced over $646 thousand dollars in one-time federal bonus bid payments and $275 thousand dollars in federal rental income in 2017.

Table 12 Bonus Bid and Rental Payments for Oil and Gas Leases on Non-Indian Federal Mineral Estates (2017)

State	County	Bonus	Rents
MT	Beaverhead		$3,429
MT	Big Horn	$487,001	$141,992
MT	Blaine	$12,480	$13,687
MT	Carbon		$4,821
MT	Carter	$1,340	-$651
MT	Dawson		$64,293
MT	Fallon	$4,840	$6,075
MT	Glacier		$510
MT	Lewis and Clark		
MT	Meagher		
MT	Musselshell		$9,087
MT	Park		
MT	Petroleum		$348
MT	Roosevelt		$5,849
MT	Rosebud	$114,024	$4,766
MT	Sheridan		$3,991
MT	Sweet Grass		
MT	Toole	$26,020	$11,053
MT	Valley	$674	$5,352
ND	Bowman		$910
Total		$646,379	$275,511

Source: ONRR data, https://revenuedata.doi.gov/downloads/federal-revenue-by-location/ accessed 26july18

A portion of the revenues collected by the Federal government is distributed to the state and counties in which the oil and gas was produced. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal

revenue associated with from oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas development from Bankhead-Jones lands are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas development on other federal acquired lands differs based upon the authority associated with those lands. Generally the revenue associated with oil and gas leasing and development that is received by the state and counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other county functions that may be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

Environmental Impacts - Alternative A – No Action

Under the No Action Alternative, none of the parcels would be offered for sale and no federal bonus bid or rental incomes would be received for the parcels awarded leases. Existing Federal leases for oil and gas properties would continue to generate rental income. Other economic uses of these parcels would continue.

Environmental Impacts - Alternative B

The collection of revenues would result from leasing the parcels proposed under Alternative B. Revenues generated by leasing Federal minerals are the bonus bids paid at the competitive lease auction and annual rents collected on leased parcels not held by production, Table 13. These revenues are collected by the Federal government which then distributes a portion of the revenues collected to the state and counties. The amount that is distributed is determined by the federal authority under which the Federal minerals are being managed. Forty-nine percent of Federal revenue associated with oil and gas from public domain lands are distributed to the state. In Montana, 25% of the royalty revenues that the state receives are then redistributed to the counties of production (Title 17-3-240, MCA). Twenty-five percent of royalties and revenues associated with oil and gas leasing and development from Bankhead-Jones lands are distributed to counties of production. Distribution of federal royalties and leasing revenues to the state for oil and gas leasing and development on other federal acquired lands differs based upon the authority associated with those lands.

Table 13. Estimated Federal Revenue Associated with the December 2018 Lease Sale

Field Office	County	Acres	Average Annual Rent (nominal)		One-time Revenue
			Years 1-5 ($1.50/acre)	Years 6-10 ($2.00/acre)	Bonus Bid (Min. $2.00/acre)
Billings	Carbon	3,802	$5,702	$7,603	$7,603
	Musselshell	3949.77	$5,925	$7,900	$7,900
	Total	7,751	11,627	15,503	15,503
Butte	Lewis and Clark	1,463	$2,195	$2,927	$2,927
	Total	1,463	2,195	2,927	2,927
Dillon	Beaverhead	12490.33	$18,735	$24,981	$24,981
	Madison	398.69	$598	$797	$797
	Total	12,889	19,334	25,778	25,778
HiLine	Blaine	1759.45	$2,639	$3,519	$3,519
	Glacier	490.15	$735	$980	$980
	Toole	4960.87	$7,441	$9,922	$9,922
	Valley	11352.34	$17,029	$22,705	$22,705
	Total	18562.81	27844.22	37125.62	37125.62
Lewistown	Meagher	3082.68	$4,624	$6,165	$6,165
	Petroleum	2760.63	$4,141	$5,521	$5,521
	Total	5843.31	8764.965	11686.62	11686.62
Mile City	Big Horn	7473.63	$11,210	$14,947	$14,947
	Custer	640	$960	$1,280	$1,280
	Dawson	2795.52	$4,193	$5,591	$5,591
	Fallon	1839	$2,759	$3,678	$3,678
	Roosevelt	79.96	$120	$160	$160
	Rosebud	16935.91	$25,404	$33,872	$33,872
	Sheridan	120	$180	$240	$240

Field Office	County	Acres	Average Annual Rent (nominal)		One-time Revenue
			Years 1-5 ($1.50/acre)	Years 6-10 ($2.00/acre)	Bonus Bid (Min. $2.00/acre)
	Total	29884.02	44826.03	59768.04	59768.04
ND	Bowman	40	$60	$80	$80
	Total	40	$60	$80	$80
TOTAL		76,434	$114,651	$152,868	$152,868

Federal leasing revenue estimates (lease rent and bonus bids) are initially based upon the number of acres being offered, however it is unknown whether all of the parcels proposed will be sold. Due to energy market volatility and the dynamics of the oil and gas industry the BLM cannot predict the exact effects of this action, as there are no guarantees that the leases will receive bids, and that any leased parcels will be developed or that developed parcels will produce any fluid minerals. Given this uncertainty, revenue estimates are calculated under the assumption that one hundred percent of the proposed parcels are sold. Federal leasing revenue estimates provided in Table 10 Estimated Federal Revenue Associated with the December 2018 Lease Sale are associated with the parcels offered under Alternative B and do not include existing lease rents. To estimate annual rent revenue it was assumed that rent would be collected during the full term of the leases (10 years) since it is unknown if and when the lease will be held by production, terminated, or relinquished. This calculation of rent revenue provides the maximum amount of annual rent revenue that may be collected. Bonus bids were calculated using the minimum rate of $2.00 per acre. Given the numerous uncertainties mentioned above, only potential federal revenue is calculated and discussed.

Lease parcels in Rosebud County could generate the greatest amount of Federal revenue with annual rent ranging from $25,404 per year for the first five years and $33,872 per year for the second five years and a one-time bonus bid revenue of $33,872, assuming one hundred percent of the proposed parcels are sold (Table 2). Beaverhead County has the second most acres up for sale and could generate $18,735 per year in annual rent for the first five years and $22,705 per year for the second five years and a one-time bonus bid revenue of $22,705, assuming one hundred percent of the proposed parcels are sold. Bowman County has the fewest acres up for sale and would likely generate the least amount of Federal revenue with annual rent ranging from $60 per year for the first five years and $80 per year for the second five years and a one-time bonus bid revenue of $80, assuming one hundred percent of the proposed parcels are sold.

The direct, indirect, and cumulative impacts from potential oil and gas development are discussed in the RMP and FEIS covering the county where the development would take place. Oil and gas development affect employment and labor income generated by 1) payments to counties associated with the leasing and rent of Federal minerals, 2) royalty payments associated with production of Federal oil and gas, and 3) economic activity generated from drilling and associated activities. The

magnitude of these types of economic effects is based upon the level and pace of development which is unknown at this time.

Environmental Impacts - Alternative C

Leasing the parcels proposed under Alternative C will produce Federal revenues in the same way as described in Alternative B. Since fewer acres will be offered, fewer Federal revenues would be collected under this option.

Table 14. Alternative C: Estimated Federal Revenue Associated with the December 2018 Lease Sale

Field Office	County	Acres	Average Annual Rent ($2018)		One-time Revenue ($2018)
			Years 1-5	Years 6-10	Bonus Bid
			($1.50/acre)	($2.00/acre)	(Min. $2.00/acre)
Butte	Lewis and Clark	1,463	$2,195	$2,927	$2,927
	Total	1,463	$2,195	$2,927	$2,927
HiLine	Blaine	694	$2,639	$3,519	$3,519
	Glacier	490	$735	$980	$980
	Toole	4,961	$7,441	$9,922	$9,922
	Total	6,145	$10,815	$14,421	$14,421
Mile City	Big Horn	2,034	$11,210	$14,947	$14,947
	Dawson	2,676	$4,193	$5,591	$5,591
	Roosevelt	80	$120	$160	$160
	Sheridan	120	$180	$240	$240
	Total	4,909	$15,703	$20,938	$20,938
TOTAL		12,517	$28,713	$38,286	$38,286

Table 14 presents the estimated Federal leasing revenues (lease rent and bonus bids) for Alternative C. Lease parcels in Toole County could generate the greatest amount of Federal revenue with annual rent ranging from $7,441 per year for the first five years and $9,922 per year for the second five years and a one-time bonus bid revenue of $9,922, assuming one hundred percent of the proposed parcels are sold (Table 11). Dawson County has the second most acres up for sale and could generate $4,193 per year in annual rent for the first five years and $5,591 per year for the second five years and a one-time bonus bid revenue of $5,591, assuming one hundred percent of the proposed parcels are sold. Roosevelt County has the fewest acres up for sale (80) and would likely generate the least amount of Federal revenue with annual rent ranging from $120 per year for the first five years and $160 per year for the second five years and a one-time bonus bid revenue of $160, assuming one hundred percent of the proposed parcels are sold.

The direct, indirect, and cumulative impacts from potential oil and gas development are discussed in the RMP and FEIS covering the county where the development would take place. Oil and gas development affect employment and labor income generated by 1) payments to counties associated with the leasing and rent of Federal minerals, 2) royalty payments associated with production of Federal oil and gas, and 3) economic activity generated from drilling and associated activities. The

magnitude of these types of economic effects is based upon the level and pace of development which is unknown at this time.

Cumulative Impacts

The leasing of a federal parcel for oil and gas exploration may result in future exploration and development of wells on this property. The direct, indirect, and cumulative impacts from oil and gas development on social conditions and environmental justice populations are discussed in the RMP and FEIS covering the county in which the development would take place.

The scoping process identified socioeconomic conditions as an area of potential concern. The pace and scale of oil and gas development can often concern local communities. Rapid development can drive important social changes due to the influx of people to these areas who find employment in the oil and gas industry and ancillary service industries. Rapid population growth for unprepared communities can cause stress on community resources such as educational infrastructure, roads and utilities, emergency services, and community cohesion. Should oil and gas leasing and subsequent development occur, impacts to people living near or using the area in the vicinity of the lease would potentially occur. Oil and gas exploration, drilling, or production, would potentially inconvenience these people through increased traffic and traffic delays, noise, and visual impacts. These impacts would be particularly noticeable in rural areas in which oil and gas development has not occurred previously. The level of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, the length of time and season in which these activities occurred, and other factors. Creation of new access roads would potentially allow increased public access and exposure of private property to vandalism. For leases in which the surface is privately owned and the mineral estate is federally owned, surface owner agreements, standard lease stipulations, and BMPs would potentially address many of the concerns of private surface owners.

Executive Order 12898 requires the analysis of disproportionately high and adverse human health effects and environmental effects on environmental justice populations. Environmental effects may include “ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment” (page 26); CEQ, 1997. Based upon U.S. Census Bureau data for 2016 and 2017, Big Horn, Blaine, Glacier, Roosevelt and Rosebud counties in Montana met the criteria for minority environmental justice populations due to the percent of residents identifying themselves as American Indian/Alaska Native and or the percentage of the population living in poverty. Adverse effects to historical and current cultural and traditional uses and values in this area are correlated to the amount of surface-disturbing or other disruptive activities allowed under the proposed action.

The BLM has considered all input from persons or groups regardless of age, income status, race, or other social or economic characteristics. The outreach and public involvement activities taken by the BiFO for this effort, including the consultation of tribes, are described in Chapter 1.

Resource Issue 3: Water Resources

Affected Environment

Water in the lease area is managed by the state of Montana. The right to use surface and groundwater is administered by the Department of Natural Resources and Conservation (DNRC). The water quality standards of Montana support other Federal laws such as the Clean Water Act of 1977, the Water Resources Planning Act of 1962, the Pollution Prevention Act of 1990, and the Safe Drinking Water Act of 1977 and are administered by the Montana Department of Environmental Quality (MDEQ). Water resources in the area are essential to the residents for agriculture, public water supplies, industry, and recreation. Additionally, water resources and the corresponding riparian-wetland areas are crucial to the survival of fish and wildlife, including many BLM-sensitive fish, reptiles, birds, and amphibians.

The field offices that are part of the December 2018 oil and gas lease sale lie within the Upper Missouri, Lower Missouri, and Yellowstone state water planning basin boundaries in Montana. Bowman County, ND is split between the Missouri-Little Missouri River and Missouri River – Lake Oahe sub-regions.

Surface Water

According to the National Hydrography Dataset (NHD High_92V.210) the parcels contain approximately 10.8 miles of perennial stream, 328 miles of intermittent/ephemeral stream, 437 acres of lakes/ponds, and 7 springs. No surface occupancy would be allowed within streams, waterbodies, riparian-wetland areas, or 100 year floodplains.

Streamflow in the area varies seasonally, with the largest flows commonly occurring in the spring or early summer. Water quality is often indirectly tied to streamflow, as it is largely dependent on the relative contributions of runoff and groundwater. Nutrients, stream alteration, sediment, and metals are often the primary cause for water quality impairments in the region (Montana 303(d)/305(b) Integrated Report, 2016). Approximately 1.9 miles of stream within nine of the parcels contain segments where one or more applicable beneficial uses have been assessed as being impaired or threatened (MTM105431GJ, MTM105431GX, MTM108952FY, MTM108952GU, MTM108952HK, MTM108952JM, MTM108952KP, MTM108952KQ, MTM79010S1) and may require additional mitigation prior to any future development. Two of the parcels contain zones classified as source water protection areas (MTM108952HX, MTM108952HY; Montana Department of Environmental Quality, 2015). No surface occupancy would be authorized in these zones.

Groundwater

The quality and availability of groundwater varies greatly across the region. Residents in Montana and North Dakota commonly get their groundwater from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations and some coal beds. Aquifers in western Montana are typically in unconsolidated, alluvial valley-fill materials within intermontane valleys. The intermontane valley aquifers often yield relatively large quantities of high-quality water to relatively shallow water wells.

Alluvial aquifers within Montana and North Dakota generally consist of Quaternary alluvium and undifferentiated Quaternary/Tertiary sediments, which include sand and gravel deposits. Alluvial aquifers occur in buried pre-glacial channels, in terrace deposits, within floodplains, along the channels of larger streams, tributaries, and rivers, and they are among the most productive sources of groundwater. Within the alluvial aquifers, water quality tends to support a broad array of beneficial uses, but can be highly variable [approximately 100 mg/l to 2,800 mg/l Total Dissolved Solids (TDS), specific conductance (SC)

of 500 to 125,000 microsiemens/centimeter (uS/cm), and sodium adsorption ratio (SAR) of 5.0 to 10]. Wells completed in coarse sand and gravel alluvial aquifers can yield as much as 100 gallons per minute (gpm), although the average yield is ~15 gpm. Alluvial deposits associated with abandoned river channels or detached terraces are topographically isolated and have limited saturation and yield as much as 20 gpm (Zelt et al. 1999).

The three principal aquifers influencing the Dillon, MT area parcels are generally comprised of outcrops of alluvium, Tertiary sediments, and volcanic rock. The geology of the area indicates Quaternary sands and gravels overlying the Tertiary sediments. There is also evidence of another aquifer that is comprised of sedimentary bedrock, which appears to be well consolidated sandstone. Well volume can vary in the area. Well in the valley bottom or near valley bottom have been tested on varying degrees. Wells located in the Tertiary sediments have been pumped at 300 gpm and showed drawdown in the Tertiary layer but the shallow groundwater was not impacted. (Butler and Abdo, 2013)

North of Helena, Montana in the Pleistocene there was an uplift that caused the streams to cut below the Flaxville plain and the correlated piedmont terraces. After, there was a second set of terraces which gravel was spread. This second set of terraces represents the first of the Pleistocene benches in this area. The relative elevation of the terraces and benches west and southwest of Great Falls, in Teton, Cascade, and Lewis and Clark Counties, and their relation to glacial moraines. (W.C. Alden 1953)

In Northern Montana the shallow groundwater yields range from one to 100 gallons per minute (gpm) but average 2 to 5 gpm. The shallow groundwater is generally marginal for domestic use due to high TDS concentrations (1,000 to 5,000 mg/L), but suitable for livestock and wildlife use.

The deeper aquifers (greater than 500 feet below land surface) in northern Montana include the Upper Cretaceous Bearpaw shale, Judith River Formation and Claggett Shale, and the much deeper Mississippian Madison Limestone. Except for the Madison, these aquifers are generally marginal or unsuitable for domestic use due to exceedingly high TDS levels. Depths of these aquifers range from 700 to 4,000 feet, making them generally too deep to be economical for livestock and wildlife use. The Madison Aquifer is generally suitable for domestic use, but again, its depth increases development cost.

Wells completed in either the Quaternary alluvium and glacial deposits or the Upper Cretaceous Judith River Formation along the Milk River Valley, from Havre, Montana, to its mouth near Nashua, Montana, express TDS concentrations ranging from 430 mg/L to 3,550 mg/L, with an average of around 1,650 mg/L . Wells expressing TDS concentrations less than 3,500 mg/L are generally suitable for stock watering purposes.

Within the vicinity of the lease parcels, the primary bedrock aquifers occur in sandstones and lignites of the Tertiary Fort Union Formation (Cenozoic rocks) (including Sentinel Butte, Cannonball, and Bullion Creek Formations) and the sandstones of the Cretaceous Hell Creek and Fox Hills formations (Mesozoic rocks). Wells within the Fort Union formation aquifers are typically 100 to 200 feet deep, but can be up to 1,500 feet in depth. These wells may produce as much as 40 gpm, but yields of 15 gpm are typical. Where aquifers are confined and artesian conditions exist, wells in the Fort Union Formation will generally flow less than 10 gpm. Well depths to the Hell Creek and Fox Hills formation aquifers are highly variable, but typically range from 200 to 1,000 feet in depth. Groundwater yields from these aquifers may be as much as 200 gpm, but are generally less than 100 gpm. Artesian wells within these aquifers may flow as high as 20 gpm (Zelt et al.1999). Groundwater yields from the deeper Paleozoic Madison formation aquifer can range from 20 to 6,000 gpm, or can be higher, in karst areas. The depth to the Madison formation aquifer in the planning area can exceed 6,000 feet. Due to the extreme depth of this aquifer, it is rarely accessed for water use. Water quality of this aquifer is highly variable and is dependent on depth, bedrock type, recharge rate, and other factors.

Local groundwater conditions within the vicinity of the lease parcels are highly variable and include many of the conditions described above. In the Montana Department of Environmental Quality and North Dakota Department of Health, water protection areas are delineated by the State for a domestic water system or include numerous public water systems, whether the source is groundwater or surface water or both, as part of the State Source Water Assessment Programs. These sites should be managed to avoid contamination to public water systems. Within the North Dakota Department of Health, there are no known sites within any of the lease sale parcels. Within the Montana Department of Environmental Quality there are two parcels: MTM 108952-HY and MTM108952-HX in Dawson county.

Any beneficial use of produced water requires water rights to be issued by North Dakota State Water Commission and Office of the State Engineer, and the Montana Department of Natural Resources and Conservation (MDNRC) as established by law. This water has been used for watering stock, irrigation, drilling operations, and industrial applications. Produced water will be disposed of in accordance with North Dakota regulation. (North Dakota, HB1409-38-11.2-07) and Montana regulation (ARM Rule 36.22.1005).

Consumptive Uses

Type and volume of water use varies between watershed basins. The two largest consumptive use of water in Montana include irrigation (82.2 percent in the upper Missouri, 42 percent in the Lower Missouri, and 83.3 percent in the Yellowstone Basin), and reservoir evaporation (13.7 percent in Upper Missouri, 56 percent in the Lower Missouri, and 7.2 percent in the Yellowstone River Basin. Industrial use only accounts for 0.04 percent of consumptive water use in the Upper Missouri, 0.003% in the Lower Missouri, and 4.2 percent in the Yellowstone River Basins. MT DNRC, 2015.

Across North Dakota, irrigation accounts for the largest consumptive use of water (47.4%). Fracking accounts for approximately 9.6 percent of consumptive uses statewide. It would be reasonable to assume that water consumption associated with fracking would be larger in areas with a high density of oil and gas wells. ND State Water Commission, May 2016.

More than 75 percent of water consumed for industrial purposes in Montana occurs within four counties: Flathead, Missoula, Lincoln, and Yellowstone (of which, only Yellowstone County is part of the December 2018 sale). Statewide, industrial water consumption totals less than 10,500 acre-feet annually. Approximately 8,000 acre feet are used in the Clark Fork Basin and 1,800 acre feet are used in the Yellowstone Basin. Major uses of industrial water in Montana are for oil and gas stimulation and recovery, processing of minerals, processing agricultural products, and manufacturing. Water use for hydraulic fracturing to stimulate oil production in horizontal wells is locally significant in the Williston Basin near the North Dakota border and potentially other areas including central Montana and the Rocky Mountain front. Water use for fracking and refracking has been reported in the range of 10 to 25 acre feet over the life of one well; however, actual use varies depending on many variables including geologic conditions and company operating practices. The Montana Board of Oil and Gas Conservation on-line database indicates that an average of 140 horizontal wells have been completed in Montana annually over the ten years ending in 2013 corresponding to potential annual water use from 1,400 acre feet to 3,500 acre feet. Both surface water and groundwater are important sources for industrial water users. MT DNRC, 2015.

Tongue River Watershed

During public comment, numerous concerns were raised regarding the potential impacts oil and gas leasing could have on the water quality/quantity in the Tongue River watershed in eastern Montana. The Tongue River drains an area of about 5,400 square miles and flows northward from its headwaters in the Bighorn National Forest of northeastern Wyoming to join the Yellowstone River at Miles City, Montana.

The river flows through lands historically used for livestock grazing and production of irrigated crops. About 86,000 acres of land in the Tongue River watershed are irrigated, with about 64,000 acres in Wyoming and 22,000 acres in Montana. Coal deposits in the upper part of the Tongue River watershed are extracted at surface coal mines near Acme, Wyoming, and Decker, Montana. Cannon et. al., 2007. Coal-bed methane (CBM) development began in the Tongue River watershed in about 1999 and occurs primarily near the Montana-Wyoming state line. Approximately 2,744 CBNG wells were active in the Tongue River basin at the end of 2010, 70% of which were in Wyoming. Hyrdro Solutions Inc, prepared for MT Board of Oil and Gas, Sept.2011. Water produced during CBM development typically has high concentrations of sodium and low concentrations of calcium and magnesium, resulting in a high sodium-adsorption ratio (SAR). High levels of SC and SAR are a concern because they could potentially reduce the quality of water for irrigation purposes. Cannon et al 2007.

The 2010 Montana Department of Environmental Quality's 303 (d) List of impaired water bodies indicates that four of the seven segments of the Tongue River basin are rated as "Partially Supporting" or "Not Supporting" of some beneficial water uses and will require a Total Maximum Daily Load (TMDL) (Montana Department of Environmental Quality 2010). The most common causes of impairments were streamflow modification from dams and diversions, irrigated crop production, stream bank and riparian zone deterioration, and natural sources. The 2010 Wyoming 303 (d) List indicates that the Tongue River below Goose Creek, much of Big and Little Goose Creeks, all of Prairie Dog Creek, and other smaller tributaries are impaired for beneficial uses (Wyoming Department of Environmental Quality 2010). The most common causes of impairments were flow alterations from dams and diversions, irrigation, sources of fecal bacteria, storm water discharges and high water temperatures. CBNG was not listed as a cause of impairment in Montana nor Wyoming. The EPA approved a TMDL for Goose Creek in September 2010 and the WYDEQ approved and published the Prairie Dog Creek Watershed Plan in January 2011. Further studies to support future TMDLs for the Tongue River in both states are still underway. Hyrdro Solutions Inc., prepared for MT Board of Oil and Gas, Sept.2011.

Kinsey and Nimick (2011) described the downstream changes in water quality along the upper Tongue River between Monarch, Wyoming and the Tongue River Reservoir in Montana, focusing on changes in salinity (as measured by specific conductance - SC) and sodium-adsorption ratios (SAR) in the river. Watershed conditions that could affect SC and SAR could include climate, land use, irrigation and other agricultural practices, water management, and CBM development.

Kinsey and Nimick (2011) found that SC generally increased in the downstream direction, and that both SC and SAR would be affected more by CBM discharges at lower flows than at higher flows. Their sampling results suggest that watershed contributions are having a larger effect on SC than existing sources of CBM discharges, but that higher SAR values may be attributed to existing CBM discharges, indicating a potential for CBM to increase the SAR in the Tongue River. Kinsey and Nimick's findings are similar to those reported in an EPA study of the Tongue River, which reported estimated salinity contributions from CBNG sources ranged from 4% to 5% while irrigation sources accounted for 20% to 21% of existing salinity. Wyoming Department of Environmental Quality 2008, U.S. Environmental Protection Agency, Tetra Tech, Inc 2007 cited in Hydro Solution Inc, prepared for MT Board of Oil and Gas, Sept 2011.

Results from Kinsey and Nimick's calculations indicated that projected SC and SAR values in the Tongue River would not exceed the State of Montana irrigation-season standards for SC and SAR for individual water samples at CBM discharges as large as 5,000 gal/min, a rate equivalent to twice the maximum allowable permitted CBM discharge.

Kinsey and Nimick's projections that project SC and SAR values would not exceed State water quality standards is supported in other research. The Sept. 2011 Hydro Solutions Inc. (MT Board of Oil and Gas) report notes that none of the Tongue River water quality stations had maximum SC readings above the

Montana Maximum SC Standards during the 2010 Water Year. The SAR average and maximum standards were met at all Tongue River USGS gauging stations in Water Year 2010, including the Miles City station, based on the daily data as well as the periodic water quality sampling conducted by the USGS (2011). The Hydro Solutions Inc study indicates that the water quality of the Tongue River varies directly with the quantity of streamflow. The salinity and sodium levels have been comparable to pre-development levels since the beginning of CBNG development in 1999. CBNG discharges are one of a number of point and non-point discharges and natural sources that affect the water quality of the Tongue River.

Environmental Impacts - Alternative A – No Action

There would be no impacts to groundwater or surface water resources from the No Action Alternative.

Environmental Impacts - Alternative B – Proposed Action

Surface & Groundwater

Offering the parcels for lease would have no direct impact to surface or groundwater resources. Any potential effects on water from the sale of lease parcels would occur at the time the leases are developed (at the APD stage) and could be both short and long-term. Potential indirect and cumulative impacts from oil and gas leasing on water resources are discussed in the applicable ARMP and FEIS for each field office, and incorporated by reference. Fluid mineral development could affect water resources during exploration, drilling, production, and/or abandonment. The magnitude of these impacts would depend largely on the specific activity, season, proximity to waterbodies, location in the watershed, density of development, effectiveness of mitigation, time until reclamation success, and characteristics of any hydrologically connected aquifers. Adherence to applicable regulations (i.e. Onshore Orders No. 1 and 2), as well as stipulations regarding steep slopes, erosive soils, streams, waterbodies, floodplains and wetlands would reduce indirect impacts that may be associated with future development (see Appendix A). However, alterations in watershed hydrology outside of the exclusion zones could affect the water resources in these systems, but such impacts would likely be small and proportional to the limited footprint of the disturbance (noted below), relative to the size of the watershed in which the disturbance were to occur.

A Reasonable Foreseeable Development (RFD) scenario for oil and gas leasing at the plan level was analyzed in the applicable ARMP for each field office. . The BLM used the plan level RFD to develop a RFD for this lease sale, which is described in Appendix D of this EA.

For Alternative B, the RFD for this lease sale estimates:

- Billings: 2 wells per year over the 10-year lease term (20 wells). With 2 wells drilled annually, that equates to a range of 7 to 11 acres of short-term disturbance and 3.5 to 11 acres of long-term disturbance per year.
- Butte: 1 wildcat well, and 1 step out well. Surface disturbance could include: 3.5 acres per well pad, 17 acres for access roads, and 7.3 acres for truck lines. This amounts to 27.8 acres per well and 55.6 acres total for two wells.
- Dillon: 1 well. The ARMP estimated 65.4 acres of total surface disturbance for 1 well, including 3.5 acres for a well pad and associated disturbances from roads, flow lines, utility line routes, waste disposals sites, etc.
- HiLine: 4 to 5 wells. For oil & gas wells other than coalbed gas and Bowdoin Dome area, each well could result in approximately 5.2 acres of short-term surface disturbance and approximately 0.92 acres of long-term surface disturbance. For Alternative B, 4-5 wells equates to a range of

approximately 20.8 to 26 acres of short-term disturbance and 3.7 to 4.6 acres of long-term disturbance.

- Miles City: 3-4 oil wells and 4-5 gas wells. Surface disturbance is estimated based on historical data for oil and gas wells in the area, and includes 16.8-22.05 acres of short-term disturbance and 6.32 to 8.27 acres of long term disturbance.
- North Dakota: 1 well. For new exploratory and development gas wells, each well pad could result in approximately 1.1 acres (0.6 for access roads and 0.5 acres for well pad) of short-term surface disturbance. For new producing gas wells, each well pad could result in approximately 0.55 acres (0.3 acres for access roads and 0.25 acres for well pad) of long-term surface disturbance.

Future oil and gas exploration and development of a lease parcel could impact surface water resources by causing the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed. The potential effects from this is accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads), which increases the energy and amount of overland flow by decreasing infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion (MDEQ 2007). These effects would be analyzed at the time of a receipt of an Application for a Permit to Drill and would be reduced through vegetation reestablishment and the application of BMP's to reduce erosion. As acres of surface disturbance increase within a watershed, however, effects on water resources could correspondingly increase.

Future oil and gas exploration and development of a lease parcel could result in spills or produced fluids that could potentially impact surface and/or groundwater resources in the short and/or long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could also deplete flows in nearby streams and springs if the aquifer is hydraulically connected to such features. These potential effects would be analyzed at the time of a receipt of an Application for a Permit to Drill. In the event of exploration or development, site-specific mitigation measures would be identified to avoid or minimize potential impacts to water resources prior to land disturbance.

To ensure that drilling and completion operations are conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance associated with Federal and Indian oil and gas mineral development. Operators must submit APDs to the agency in accordance to Onshore Oil and Gas Order No.1. Prior to approving an APD, the BLM identifies all potential subsurface formations that will be penetrated by the wellbore. This includes groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures. All well casing and cementing operations that occur on Federal/Indian lands would be reviewed and approved by BLM and conducted in accordance with the applicable requirements specified in Onshore Oil and Gas Order No. 2 and the American Petroleum Institute (API) standards.

Hydraulic Fracturing: Around 2005, the combination of modern hydraulic fracturing and directional drilling significantly contributed to a surge in oil and gas production in the United States (Figure 3). Hydraulic fracturing is widely used in unconventional (low permeability) oil and gas reservoirs that include shales, tight oil and tight gas formations, and in conventional reservoirs.

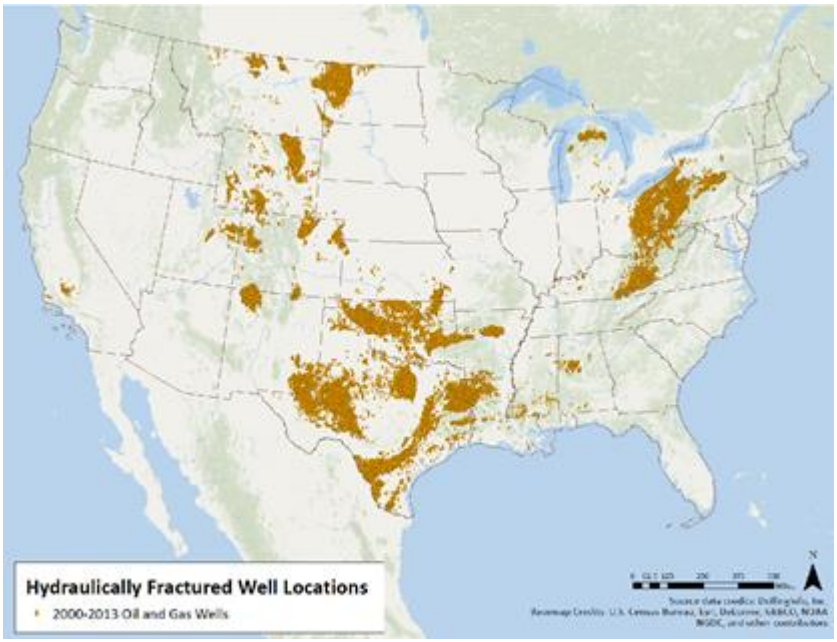
Using data from several commercial and public sources, the EPA estimates that 25,000 to 30,000 new wells were drilled and hydraulically fractured in the United States annually between 2011 and 2014.

These hydraulic fracturing wells are geographically concentrated; in 2011 and 2012 almost half of hydraulic fracturing wells were located in Texas, and a little more than a quarter were located in the four states of Colorado, Pennsylvania, North Dakota, and Oklahoma (USEPA 2016, page 3-1).

Hydraulic fracturing has been utilized by the oil and gas industry since the late 1940s as a standard treatment for stimulating the productivity of oil and gas wells. The process consists of pumping a fluid containing a propping agent into a wellbore at high pressure in order to create and stabilize fractures that extend from the wellbore into the target oil or gas formations.

To create or enlarge fractures, fluid typically comprised of water and additives is pumped into the productive formation at a gradually increasing rate and pressure. Hydraulic fracturing fluid is approximately 98 percent water with the remainder being chemical additives and propping agents (proppant), such as sands. Chemicals used in stimulation fluids include acids, friction reducers, surfactants, gelling agents, scale inhibitors, corrosion inhibitors, antibacterial agents, and pH adjusting agents and typically comprise less than two percent of the total fluid.

Figure 3: Locations of the approximately 275,000 wells drilled and hydraulically fractured between 2000 and 2013. (USEPA, 2016)



When the pressure exceeds the rock strength, the fluids create or enlarge fractures that can extend several hundred feet away from the well. As the fractures are created, a propping agent (usually sand) is pumped into the fractures to keep them from closing when the pressure is released. After fracturing is completed, the majority of the injected fluid returns to the wellbore and is reused or disposed of at an approved disposal facility. Proppant, consisting of synthetic or natural silica sand, may be used in quantities of few hundred tons for a vertical well to a few thousand tons for a horizontal well.

A typical hydraulic fracture stimulation technique involves 5-100 stages. Each stage is a section of the wellbore in the producing formation. This allows for more efficient use of hydraulic fracturing fluid and proppant with a more evenly distributed treatment of the full length of the producing formation. Once all the stages have been completed, the wellbore is cleaned out and put on production. Within the larger BLM Montana-Dakotas planning area, hydraulic fracturing, in conjunction with horizontal drilling, has allowed for development of unconventional zones that were once considered uneconomical, like the Bakken and Three Forks Formations in the Williston Basin area.

Fractures created during hydraulic fracturing enable better flow of oil and gas from the reservoir into the production well. Water that naturally occurs in the oil and gas reservoirs also typically flows into and through the production well to the surface as a byproduct of the oil and gas production process. Wells that undergo hydraulic fracturing may be drilled vertically, horizontally, or directionally and the resultant fractures induced by the hydraulic fracturing can be vertical, horizontal, or both.

Oil and gas contained in geologic formations is often not under sufficient hydraulic pressure to flow freely to a production well. The formation may have low permeability or the area immediately surrounding the well may become packed with cuttings. A number of techniques are used to increase or enhance the flow. They include hydraulic fracturing and acid introduction to dissolve the formation matrix and create larger void space(s). The use of these flow enhancement techniques and secondary recovery methods result in physical changes to the geologic formation that will affect the hydraulic properties of the formation. Typically, the effects of these techniques and methods are localized to the area immediately surrounding the individual well, are limited to the specific oil and gas reservoir, and do not impact adjacent aquifers, which are then piped directly to enclosed tanks or to a production unit.

Oil and gas operators must maintain water resource integrity through operations that prevent or minimize adverse effects to surface and subsurface resources, minimize surface disturbance, and conform to currently available technology, industry standards and regulations. Oil and gas operators cannot commence either drilling operations or preliminary construction activities before the BLM's approval of the Application for Permit to Drill (APD). A copy of the approved APD and any Conditions of Approval must be available for review at the drill site and all operators, contractors, and subcontractors must comply with the requirements of the approved APD and/or Surface Use Plan of Operations. Unless it is otherwise provided in an approved Surface Use Plan of Operations, the operator must not conduct operations in riparian areas, floodplains, playas, lakeshores, wetlands, and/or areas subject to severe erosion and mass soil movement.

Freshwater-quality water is required to drill the surface-casing section of the wellbore per federal regulations; other sections of the wellbore (intermediate and/or production strings) would be drilled with appropriate quality makeup water as necessary. This is done to protect usable water zones from contamination, to prevent mixing of zones containing different water quality/use classifications, and to minimize total freshwater volumes. With detailed geologic well logging during drilling operations, geologists/mud loggers on location identify the bottoms of these usable water zones, which aids in the proper setting of casing depths.

Drilling muds, drilling fluids, water, proppant and hydraulic fracturing fluids are stored in onsite tanks or lined pits during the drilling and/or completion process. Equipment transport and setup can take several days, and the actual HF and flowback process can occur in a few days up to a few weeks. For oil wells, the flowback fluid from the HF operations is treated in an oil-water separator before it is stored in a lined pit or tank located on the surface. Where gas wells are flowed back using a "green completion process" fluids are run through a multi-phase separator.

Authorization of the proposed projects would require full compliance with local, state, and federal directives and stipulations that relate to surface and groundwater protection and the BLM would deny any APD who proposed drilling and/or completion process was deemed to not be protective of usable water zones as required by 43 CFR 3162.5-2(d). The EPA and various State agencies regulate the disposal of wastes generated by the development and production of oil and gas. Underground waste disposal is regulated under the Underground Injection Control (UIC) program, which is authorized under the Safe Drinking Water Act (SDWA). The Resource Conservation and Recovery Act (RCRA) conditionally exempted wastes associated with exploration, development, and production of oil and gas from regulation

as a hazardous waste. Exempted wastes include well completion, treatment and stimulation fluids, workover wastes, packing fluids, and constituents removed from produced water before disposal. Any proposed drilling/completion activities would have to be in compliance with Onshore Order #2, 43 CFR 3160 regulations, and not result in a violation of a Federal and/or State law. If these conditions were not met, the proposal would be denied. As such, no significant impacts to groundwater from the proposed action are expected.

Hydraulic fracturing can occur at or near the bottom of a production well or it may take place at different intermediate depths depending on the location of economically producible oil and gas, and thus the total vertical depth of a production well does not necessarily correlate to the depth at which hydraulic fracturing occurs. The distance from the base of the fresh water resource to the shallowest hydraulic fracturing initiation point in a production well serves as a separation distance and can be an important consideration when evaluating potential impacts to fresh water resources from fluid mineral extraction (USEPA 2016).

Underground, hydraulic fracturing can occur in close vertical proximity to fresh water resources. In some parts of the United States (e.g., the Powder River Basin in Montana and Wyoming), there is no vertical distance between the top of the hydraulically fractured oil- or gas-bearing rock formation and the bottom of treatable water, as determined by data from state oil and gas agencies and state geological survey. (USEPA, 2016; page ES-8). When hydraulically fractured oil and gas production wells are located near or within fresh water resources, there is a greater potential for activities in the hydraulic fracturing water cycle to impact those resources. Hydraulic fracturing within fresh water resources introduces hydraulic fracturing fluid into formations that may currently serve, or in the future could serve, as a beneficial public or private use. This could be of concern in the short-term if people are currently using these formations for a beneficial use, such as a drinking water supply. It could also be of concern in the long-term, because drought or other conditions may necessitate the future use of the water within these formations (USEPA 2016, page ES-32).

In naturally fractured or cleated formations, such as gas shales or coal seams, it is possible that multiple fractures can be created and propagated during a hydraulic fracture treatment. Hydraulic fracturing can open up pathways for fluids or gases from geologic layers to flow where they are not intended, which presents an opportunity for groundwater contamination. Surface water resources could experience negative effects if fracturing fluid chemicals and wastewater leak or spill from the well bore, flowlines, trucks, tanks, or pits

Various types of casing are placed in the drilled hole to enhance completion operations and safety. Casing is a string of steel pipe composed of approximately 40-foot lengths of pipe that are threaded together. Centralizers are attached to casing to ensure that the casing is centered in the hole. This practice improves the efficacy of cement jobs. Casing is cemented into the well to protect against migration of fluids along the annulus between the casing and the hole. Cementing isolates the formations so they can be completed and produced without interference from other zones containing hydrocarbons or water. Hole deviation, depth, borehole environment, placement of centralizers, and a myriad of other factors affect the integrity of the casing and cement job, and must be considered in the original design.

Since the 1930s, most States have required that multiple barriers be included in well construction and abandonment to prevent migration of injected water, formation fluids, and produced fluids. These barriers include (1) setting surface casing below all known aquifers and cementing the casing to the surface, and (2) extending the casing from the surface to the production or injection interval and cementing the interval. Barriers that can be used to prevent fluid migration in abandoned wells include cement or mechanical plugs. They should be installed (1) at points where the casing has been cut, (2) at the base of the lowermost aquifer, (3) across the surface casing shoe, and (4) at the surface. Individual states and the BLM have casing programs for oil and gas wells to limit cross contamination of aquifers.

The use of practices such as but not limited to closed-loop mud systems or lined reserve pits would reduce or eliminate seepage of waste fluids into the soil and eventually reaching groundwater. The casing and cementing requirements imposed on proposed wells would reduce or eliminate the potential for groundwater contamination from drilling/completion/production fluids and other surface sources. Additional mitigation could include, but would not be limited to: the use of recycled water for drilling and completion fluids below the surface casing zone, installation of backflow preventers, installation of oil and gas related water wells to aquifers below those providing residential and/or municipal water supplies and then cementing from the nearest shale/clay zone below the deepest culinary/livestock water well in the vicinity back to the surface, and insuring that access to water wells is only provided to authorized users. Using the lowest quality water necessary and cementing any water supply wells to surface will reduce the potential for mixing of lower quality waters with potable sources.

"As required by Onshore Oil and Gas Order 1. III. D. 3. (b), when submitting an APD to the BLM, the operator must include in the drilling plan "estimated depth and thickness of formations, members, or zones potentially containing usable water, oil, gas, or prospectively valuable deposits of other minerals that the operator expects to encounter, and the operator's plans for protecting such resources." It is up to the BLM Petroleum Engineer and/or the Geologist to analyze the information submitted to determine if the operator's plan to protect usable water is adequate. Approval of operator submitted casing setting depths takes into consideration relevant factors such as, "presence/absence of hydrocarbons; fracture gradients; usable water zones; formation pressures; lost circulation zones; other minerals; or other unusual characteristics. All indications of usable water shall be reported." (Onshore Order 2. III. B.) The surface casing is the only casing string with the requirement to cement to the surface. The BLM considers the water zone in these wells to be protected by the surface casing and shale in which it is set and the top of cement and shale below the water zone."[FZL1] [MCE2]
(https://www.federalregister.gov/documents/2005/07/27/05-14103/onshore-oil-and-gas-operations-federal-and-indian-oil-and-gas-leases-onshore-oil-and-gas-order)

The amount of water needed to hydraulic fracture a well depends on the geologic basin, the length and type of formation, and the proposed completion process. Vertical completions typically require much less hydraulic fracturing fluids than horizontal completions. For example, in a vertical completion the wellbore may penetrate 30 feet of the formation but in a horizontal completion the wellbore may penetrate two miles (10,560 feet) of the formation. A vertical completion may be hydraulically fractured in one stage and horizontal completion in up to 100 stages.

Across the United States, the median volume of water used, per well, for hydraulic fracturing was approximately 1.5 million gallons between January 2011 and February 2013. Table 15 below identifies median volumes, and the 10^{th} and 90^{th} percentiles for water use per hydraulically fractured well between January 2011 and February 2013 for 15 states including Montana and North Dakota (USEPA 2016a). North Dakota's median volume per well (2,022,380 gallons is more than the national median volume whereas Montana's medium volume (1,455,757 gallons) is less than the national median volume. While hydraulic fracturing uses billions of gallons of water every year at the national and state scales, when expressed relative to total water use or consumption, however, hydraulic fracturing generally accounts for only a small percentage, usually less than 1%. (USEPA, 2016, page 4-46).

Table 8. Water use per hydraulically fractured well between January 2011 and February 2013. Medians and percentiles were calculated from data submitted to FracFocus 1.0

State	Number of FracFocus 1.0 Disclosures	Median Volume per Well (gallons)	10th percentile (gallons)	90th percentile (gallons)
Arkansas	1,423	5,259,965	3,234,963	7,121,249
California	711	76,818	21,462	285,306
Colorado	4,898	463,462	147,353	3,092,024
Kansas	121	1,453,788	10,836	2,227,926
Louisiana	966	5,077,863	1,812,099	7,945,630
Montana	**207**	**1,455,757**	**367,326**	**2,997,552**
New Mexico	1,145	175,241	35,638	1,871,666
North Dakota	**2,109**	**2,022,380**	**969,380**	**3,313,482**
Ohio	146	3,887,499	2,885,568	5,571,027
Oklahoma	1,783	2,591,778	1,260,906	7,402,230
Pennsylvania	2,445	4,184,936	2,313,649	6,615,981
Texas	16,882	1,420,613	58,709	6,115,195
Utah	1,406	302,075	76,286	769,360
West Virginia	273	5,012,238	3,170,210	7,297,080
Wyoming	1,405	322,793	5,727	1,837,602

USEPA, 2016a

Using the assumption that all wells ultimately put into production as a result of this lease sale utilize hydraulic fracturing, and use water similar to the state median water use identified in Table 12 above, it is possible to provide very coarse estimates of the volume of water that would be used annually based on the sale specific RFD. All numbers are approximate and could very substantially based on site characteristics and other factors, including:

- Billings: 2 wells per year, approximately 1.5 million gallons water (4.6 acre feet)
- Butte: 1 step out well, approximately 727 thousand gallons water (2.2 acre feet)
- HiLine: 4 to 5 wells, approximately 2.9 to 3.6 million gallons water (8.9 – 11 acre feet)
- Miles City: 7 to 9 wells, approximately 5 million to 6.5 million gallons water (15.3 acre feet to 19.9 acre feet)
- North Dakota: 1 well, approximately 1 million gallons water (3 acre feet).

The three major sources of water for hydraulic fracturing are surface water (i.e., rivers, streams, lakes, and reservoirs), groundwater, and reused hydraulic fracturing wastewater. Potential water sources available for hydraulic fracturing and drilling operations in Montana and North Dakota vary considerably in space

and time, but may include irrigation water that is leased or purchased, water purchased from a water provider such as municipalities, treated wastewater, new surface water diversions, produced water, reused or recycled drilling water, or on-location water supply wells. During the chemical mixing stage of the hydraulic fracturing, chemicals are added to water to alter its properties for hydraulic fracturing, some of which are known to be hazardous to human health. The severity of impacts on fresh water resources depends, in part, on the identity and amount of chemicals that enter the environment, which can vary from well to well, and from site-specific characteristics. Operators must comply with Montana and North Dakota water law and secure necessary water rights from the Montana Department of Natural Resources and Conservation and the North Dakota State Water Commission.

Water Quantity: Oil and Gas drilling operations could impact available quantities of surface water and groundwater. Refer Table 8 and estimate water usage based on the sale specific RFD on page 60. The potential for impacts depends on the combination of water withdrawals and water availability at a given withdrawal location. Where water withdrawals are relatively low compared to water availability, adverse impacts are unlikely to occur. Where water withdrawals are relatively high compared to water availability, impacts are more likely. Areas reliant on declining groundwater are particularly vulnerable to more frequent and severe impacts from cumulative water withdrawals, including withdrawals for hydraulic fracturing. Among surface water sources, smaller streams are more vulnerable to frequent and severe impacts from withdrawals. Seasonal or long-term drought can also make impacts more frequent and severe for surface water and groundwater sources.

Water withdrawals could lead to reduced aquifer water levels, reduced streamflow (through direct withdrawals or drawdown of aquifers that are hydraulically connected to nearby streams or springs), and impacts to water quality parameters associated with stream flow. Typically, produced water from conventional oil and gas wells would originate from a depth below useable aquifers or coal seams.

Compliance with state regulations would help mitigate the impacts of water withdrawals on surface and groundwater by ensuring that water rights are established for all beneficial uses of water, ensuring that water resources are not over-appropriated, and considering the impacts of water withdrawals to groundwater wells and hydraulically connected surface waters.

Water Quality: Potential impacts on groundwater resources from fluid mineral extraction activities could include the following scenarios:

- Contamination of aquifers during drilling through the introduction of drilling fluids.
- Extended fracture growth allowing fracking fluid migration into fresh water resources;
- Cross-contamination of aquifers from the introduction of drilling fluids into one aquifer that travels upward into shallower units due to improperly sealed well casings.
- Localized depletion of unconfined groundwater availability.
- Progressive contamination of deep confined, shallow confined, and unconfined aquifers if the deep confined aquifers are not completely cased off from deeper units.
- Contamination of shallow aquifers by improperly managed or closed reserve pits.

Groundwater quality is most susceptible to pollution where the aquifer is shallow, highly permeable, or connected directly to a surface water system, such as river gravels.

Future oil and gas exploration and development of a lease parcel could result in spills or produced fluids could potentially impact surface and groundwater resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids, fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004).

Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features.

Standard stipulation 16-3 requires the Agency to furnish data on any special areas, which may include domestic water supplies within 1000 feet of parcels, and stipulates that surface use or occupancy will be controlled to prevent damage to surface or other resources. This level of review and need for additional mitigation would occur at the APD stage for wells located within 1000 feet of the proposed parcels. As noted above, there are no known wells within 1000 feet of the proposed parcels. (North Dakota State Water Commission map service: http://mapservice.swc.nd.gov/index.phtml?active=Wells, and *Onshore Order 2. III. B* for Montana: T:\MT\gisprojects\StateOffice\24K\Hydrology\Source Water Protection\SWP_IR.gdb)[FZL3] [MCE4]

Chemical mixing and produced water handling activities can impact water resources through spills of chemicals used to make hydraulic fracturing fluid, hydraulic fracturing fluid itself, or produced water reaching surface water or groundwater. There is limited data available regarding spills. An analysis of North Dakota produced water spills found there were approximately 5 to 7 spills of produced water per 100 active wells between 2010 and 2015 (USEPA, 2016; page 10-9). However, not all spills may reach or impact a drinking water resource. The size of the spill and site characteristics will influence whether a spill reaches a drinking water resource. Sandier soils and more permeable rock can increase the potential for spills to reach groundwater. Spill prevention and response factors would be incorporated as Conditions of Approval at the APD stage, and may reduce the frequency and severity of impacts to drinking water resources from spills.

Potential effects to deeper aquifers may include cross-aquifer mixing through the wellbore. All wells would be cased and cemented to depths below accessible freshwater zones pursuant to Montana Board of Oil and Gas Conservation (MBOGC) and North Dakota Department of Health (NDDH) rules and federal regulations. All wells also would be constructed according to relevant MBOGC, NDDH, and Montana Department of Environmental Quality (MDEQ) regulations to prevent cross-aquifer contamination. There would be minor potential for commingling of waters during well construction if proper well drilling procedures and completion techniques are employed.

Produced water from conventional oil and gas, uranium recovery, and Coal Bed Natural Gas (CBNG) development could impact the quality of surface water and groundwater through impoundments, injection, and discharge. Impounding or discharging produced water could increase evaporative losses of groundwater. Left untreated, produced water discharge and infiltration or leaking produced water disposal pits could reach stream channels via subsurface flow, which could decrease water quality. Proper siting and design of disposal pits would mitigate these impacts. Underground injection control regulations would isolate injection zones from potentially useable aquifers, which would limit the impacts.

The use of any specific water source on a federally administered well requires review and analysis of the proposal through the NEPA process, which will be completed at the APD stage. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007), would be followed, and site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored in order to minimize effects to water resources. All proposed actions must comply with local, state, and federal regulations, including Montana and North Dakota water laws. Additional information on water rights and the availability of water resources in the project area can be obtained at the local Montana Department of Natural Resources and Conservation (MDNRC) Water Resources Office, and North Dakota State Water Commission (NDSWC).

In addition to federal regulations, the MBOGC and North Dakota Department of Health (NDDH) and North Dakota Department of Mineral Resources (DMR) have regulations, which ensure that all resources including groundwater are protected. The MBOGC and NDDH regulations require new and existing

wells, which will be stimulated by hydraulic fracturing, to demonstrate suitable and safe mechanical configuration for the stimulation treatment proposed. If the operator proposes hydraulic fracturing through production casing or through intermediate casing, the casing must be tested to the maximum anticipated treating pressure. All surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface in accordance with Onshore Oil and Gas Order No. 2, MBOGC and NDDH rules and regulations, and American Petroleum Institute (API) standards. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. In accordance with MBOGC Rule 36.22.1015, operators are required to disclose and report the amount and type of fluids used in well stimulation to the Board or, if approved by the Board, to the Interstate Oil and Gas Compact Commission/Groundwater Protection Council hydraulic fracturing web site FracFocus.org. In accordance with North Dakota, Rule 43-02-05-06; all injection wells shall be cased and cemented to prevent movement of fluids into or between underground sources of drinking water or into an unauthorized zone. The casing and cement used in construction of each new injection well shall be designed for the life expectancy of the well.

Environmental Impacts - Alternative C

Under Alternative C, 23 parcels would be offered for lease in the December 2018 oil/gas lease sale. Three parcels in Beaverhead County would be deferred, and 76 parcels in designated sage-grouse habitat would be eliminated from this sale. It is reasonably foreseeable that the 76 parcels could be offered on a subsequent sale. As detailed in Appendix D, the RFD estimated that six wells may be built under Alternative C. The effects would be similar to that described under Alternative B, but for a fewer number of wells. Under the same assumptions described under alternative B, six wells could use approximately 4.3 million gallons of water annually (13.2 acre-feet).

Cumulative Impacts

With more oil and gas wells being developed in proximity of fresh water there is a potential for groundwater and surface water decline. The vulnerability of the decline is directly associated with the water need, the quantity and quality of the groundwater, and the cumulative withdrawals. The hydraulic fracturing of the proposed parcels will join the other oil and gas wells in the area for the use of groundwater and surface water.

Groundwater recharge rates can be extremely low, and groundwater pumping can exceed recharge rates in many areas of the country. (Konikow, 2013) Cumulative drawdowns can affect surface water bodies since groundwater can be the source of base flow in streams (Winter et al., 1998) and alter ground water quality by mobilizing chemicals from geologic sources, among other means (DeSimone et al., 2014; Alley et al., 1999).

Aquifers can be affected directly and indirectly by increasing the number of wells in an area. Direct impacts are a result of direct use of the groundwater. Indirect ramifications are a result of declines in surface water resources which will lead to increased groundwater withdrawals and a net cumulative depletions of groundwater. (Castle et al. 2014; Georgakakos et al., 2014; Konikow, 2013; Famigliette et al., 2011).

It should be noted that cumulative impacts on water quality findings associated with hydraulic fracturing are inconclusive at this time. However, it has been observed that pumping can promote changes in reduction-oxidation (redox) conditions and thereby mobilize chemicals from geologic sources (DeSimone et al., 2014). Similar patterns of groundwater quality degradation associated with prolonged aquifer depletion (i.e., salinization and contamination) have also been observed. (U.S. Environmental Protection Agency; (2016).

According to Montana Board of Oil and Gas data (see Appendix D), Big Horn County currently has 314 oil/gas wells with three new wells completed in 2017. Rosebud County has 215 oil/gas wells, with no new wells completed in 2017. Under Alternative B, 20 parcels would be offered for sale in Rosebud County and 15 parcels in Big Horn County, totaling 19,060 acres in the Tongue River basin. Under Alternative C, 3 parcels totaling 2,034 acres would be offered for lease in Big Horn County. The parcels have medium development potential. The sale specific RFD estimates approximately 2.5 wells in Big Horn County and 4.3 wells in Rosebud County, for about 7 wells total. Under Alternative C, the RFD estimates 1 well in Big Horn County. It is reasonably foreseeable that the Alterative B parcels that were removed in Alternative C could show up on a future sale and that additional parcels in the Tongue River basin would be nominated. Combined with past wells, the additional 1 to 7 wells forecasted as a result of the December 2018 lease sale would likely not contribute to any violations of state water quality standard violations, assuming new wells are constructed and operated in accordance with existing regulations.

Water quality monitoring of the Tongue River watershed is an ongoing effort, and a TMDL is being prepared. Salinity TMDLs will be written for the lower two segments of the river (from Beaver Creek to the confluence of the Yellowstone River). As of DEQ's 2016 Water Quality Integrated Report, which contains a list of all of Montana's waters that are impaired for a pollutant (i.e., not meeting Montana's water quality standards for that pollutant), only the lowermost segment of the Tongue River is identified as impaired for salinity (Twelve Mile Dam to the confluence with the Yellowstone River). Salinity includes both electrical conductivity (EC) and sodium adsorption ratio (SAR). Therefore, a TMDL will be written for EC for this segment of the river, and a TMDL may also be written for SAR. Based on recent water quality data, the segment between Beaver Creek and the Twelve Mile Dam also has elevated salinity levels. Although this segment of the river has not been determined as impaired for salinity, an EC TMDL will also be written for this segment of the river, and a SAR TMDL may be written as well. MTDEQ (http://mtwaterqualityprojects.pbworks.com/w/page/108827317/Tongue%20River%20Watershed%20TMDL%20Development).

Resource Issue 4: GREATER SAGE-GROUSE

Introduction

The public has identified a concern that the BLM is not adhering to the prioritization objective identified in the September 2015 Record of Decisions and Approved Resource Management Plan Amendments for the Great Basin and Rocky Mountain Regions, thus undermining protections put in place to conserve greater sage-grouse habitat.

The greater sage-grouse is an upland game bird native to Montana, North and South Dakota, and eight other western states. Due to habitat loss and fragmentation, the population of sage grouse has declined across its range. As recently as 2015, the U.S. Fish and Wildlife Service (USFWS) considered it for listing under the federal Endangered Species Act. On October 2, 2015, USFWS published its decision that listing was not warranted due to the commitments federal agencies and western states made to institute regulatory mechanisms and habitat protection measures.

The greater sage-grouse is classified as a BLM special status sensitive species. Under Manual 6840 (Special Status Species Management), actions authorized by the BLM shall further the conservation of Bureau sensitive species. Bureau sensitive species are managed consistent with species and habitat management objectives in land use and implementation plants to promote their conservation and to minimize the likelihood and need for listing under the Endangered Species Act. Manual 6840 directs the BLM to incorporate best management practices, standard operating procedures, conservation measures, and design criteria to mitigate specific threats to Bureau sensitive species during the planning of activities and projects.

In 2015, the BLM approved Record of Decisions and Approved Resource Management Plan Amendments for the Great Basin and Rocky Mountain Regions, which cover the MT/Dakotas BLM. The Dillon Field Office is part of the Great Basin Region and the Billings, Miles City, Glasgow and Havre (HiLine), Lewistown, and North Dakota Field Offices are part of the Rocky Mountain Region. Each of these field offices manages BLM designated sage-grouse habitat. (The State of Montana also designed sage-grouse habitat in Park County, but the Butte RMP was not part of the RMP amendment and does not include any federally designated habitat.)

Both the Rocky Mountain and Great Basin RODs/ARMPs provide a set of management decisions focused on specific GRSG conservation measures on BLM-administered lands and provide overall resource management plan direction for managing all resources on BLM-administered land in their respective Planning Areas.

The ARMPs designate areas as open or closed to fluid mineral leasing (resource allocations), and designate specific areas that provide sage-grouse habitat as Priority Habitat Management Areas (PHMAs), General Habitat Management Areas (GHMA), or Restoration Habitat Management Areas (RHMAs) subject to management actions designed to avoid and minimize disturbances associated with proposed projects (i.e., stipulations). Stipulations may include No Surface Occupancy – NSO, Controlled Surface Use – CSU, and / or Timing Limitations - TL). In addition to the resource allocations and stipulations, the ARMPs describe a Prioritization Objective, which states:

> ***Prioritization Objective*** *- In addition to allocations that limit disturbance in PHMAs and GHMAs, the ARMPs and ARMPAs prioritize oil and gas leasing and development outside of identified PHMAs and GHMAs. This is to further limit future surface disturbance and encourage new development in areas that would not conflict with GRSG. This objective is intended to guide development to lower conflict areas and as such protect important habitat and reduce the time and cost associated with oil and gas leasing development by avoiding sensitive areas, reducing the complexity of environmental review and analysis of potential impacts on sensitive species, and decreasing the need for compensatory mitigation (Rocky Mountain ROD, page I-25).*

To clarify how the prioritization objective would be implemented, the BLM Washington Office issued **Instruction Memorandum (IM) 2016-143** on September 1, 2016, which was replaced with **Instruction Memorandum (IM) 2018-026** on December 27, 20017. Both of these IMs clarified that the objective does not preclude leasing in designated habitat, but allows leasing with appropriate stipulations on all BLM mineral estate designated in the GRSG Plans as "open" for leasing. Both the IM's identify considerations to take into account when determining which parcels to carry forward into a sale. The 2018 IM notes, *where the BLM has a backlog of Expressions of Interest for leasing, the BLM will prioritize its work first in non-habitat management areas, followed by lower priority habitat management areas (e.g., GHMA) and then higher priority habitat management areas (i.e., PHMA, then SFA).*

In Montana, Executive Orders 12-2015 and 21-2015 (Executive Order or Order) were adopted to conserve sage-grouse habitat across all lands in the state, and apply to any projects requiring a state permit, technical assistance, or state grant funds in designated sage-grouse habitat (as defined in the Executive Order). Montana's Order outlines stipulations for land uses and activities occurring in designated sage grouse habitat, require newly proposed land uses and activities to avoid, minimize, and reclaim impacts to sage grouse habitat to the extent feasible, and to provide compensatory mitigation for any remaining impacts, including those that are indirect or temporary. The goal of the Montana sage-grouse program is to keep sage grouse populations healthy and under state management so that a listing or designation as a candidate species under the federal Endangered Species Act is not warranted. Areas designed by the State of Montana as "Core" habitat, generally correspond to areas designed by the BLM as PHMA, with some exceptions. Montana also designated General Habitat and Connectivity Habitat.

Due to the small amount of sage-grouse habitat in North Dakota, sage-grouse habitat protections are driven by applicable federal land use management plans.

Affected Environment

Of the 119 parcels under review in this lease sale (116 EOIs and 3 BLM nominated parcels), 94 of them occur in designated sage-grouse habitat. All but one parcel are in BLM designated PHMA, GHMA, or RHMA. One parcel in Park County occurs in state designated general habitat, but was not designated by the BLM. Of the 94 parcels in sage-grouse habitat, the BLM is deferring all or part of 16 parcels as part of the proposed action (refer to Chapter 2), including:

- Thirteen parcels managed by the Lewistown Field Office in Meagher and Petroleum Counties (approx. 5,643 acres),
- All of one parcel and part of one parcel in Carbon County managed by the Billings Field Office (approx. 842 acres), and
- One parcel in Park County managed by the Butte Office (approx. 392 acres).

That leaves 78 full parcels and part of one parcel in the Proposed Action that could be offered in the December 2018 lease sale that lie within designated sage-grouse habitat. These parcels include 25 parcels in sage-grouse habitat that were previously deferred from BLM sales consistent with the prioritization objective and guidance provided in the IMs (16 parcels in the Dillon Field Office and 9 parcels in the Glasgow Field Office).

The 2015 ARMPs direct the BLM to evaluate impacts to leks from actions requiring NEPA analysis using lek buffer-distances identified in the USGS Report Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review (Open File Report 2014-1239), which is 3.1 miles for infrastructure related to energy development (Billings ARMP, Appendix B, page B-1). The BLM overlaid the proposed parcels on designated habitat as well as known active leks, and placed the parcels into one of 8 bins (**Table 16**). **There are 49 parcels that lie with the 3.1 mile lek buffer distance** (2 within existing disturbance, 31 with no existing disturbance and high or medium development potential, and 16 with no existing disturbance and low development potential). Maps of this prioritization review are available in the project file.

Table 9: Sage-Grouse Assessment Category and Number of Nominated Parcels and Acres within Each Category

Category	Reference	# of Parcels	Acres
Category 1	Legal Obligation; (in sage-grouse habitat)	2	587
Category 1	Legal Obligation; **(Non- habitat)**	1	80
Category 2	**Non-habitat**	24	12,865
Category 3	Within Existing Disturbance/ Outside 3.1 mile from Lek	4	679
Category 4	Within Existing Disturbance/ Within 3.1 mile of Lek	**2**	1,924
Category 5	No Existing Disturbance/ Outside 3.1 mile from Lek/ High or Medium RFD	20	10,437

Category	Reference	# of Parcels	Acres
Category 6	No Existing Disturbance/ Outside 3.1 mile from Lek/ Low RFD	19	16,624
Category 7	No Existing Disturbance/ Within 3.1 mile of Lek/ High or Medium RFD	**31**	18,667
Category 8	No Existing Disturbance/ Within 3.1 mile of Lek/ Low RFD	**16**	14,207
Total		119	76,070

For projects under review by the State of Montana, the state may assign stipulations within two and four miles of active leks to avoid and minimize project related disturbances (EO 12-2015 and https://sagegrouse.mt.gov/FAQ). There are currently **171 active leks** the lie within four miles of proposed parcels. Of these active leks, **53** of them lie within two miles of proposed parcels. See **Table 17.**

Table 10: Number of active leks within 2 miles and 4 miles of proposed parcels

Field Office	County	Number of active leks within 2 miles of proposed parcels	Number of active leks within 4 miles of proposed parcels	Number of parcels & acres deferred
Billings	Carbon	5	18	2 parcels[1] (842 acres)
Billings	Musselshell	6	11	
Billings	Petroleum	1	6	
Butte	Park	0	0	1[2] (762 acres)
Dillon	Beaverhead	2	16	
Glasgow	Valley	8	15	
Havre	Blaine	0	5	
Lewistown	Garfield	0	2	14 parcels[3] (5,842 acres)
Lewistown	Petroleum	6	22	
Lewistown	Meagher	2	7	
Miles City	Big Horn	2	12	
Miles City	Carter	0	1	
Miles City	Custer	1	3	
Miles City	Fallon	0	3	
Miles City	Rosebud	17	38	
Miles City	Garfield	3	8	

Field Office	County	Number of active leks within 2 miles of proposed parcels	Number of active leks within 4 miles of proposed parcels	Number of parcels & acres deferred
Miles City	Petroleum	0	2	
North Dakota	Bowman	0	2	
Total		53	171	

1. Carbon county deferrals include all of parcel KC (80 acres) and a portion of parcel KG (762 acres). Parcel GU in Sweet Grass County (75 acres) is also deferred, but is not sage-grouse habitat.
2. Butte field office parcel being deferred is designated State of Montana general habitat, but not BLM designated GHMA.
3. All Lewistown parcels are deferred.

Environmental Impacts - Alternative A No Action

Under No Action, the BLM would not conduct the December 2018 oil/gas lease sale. None of the parcels (94 of which occur in designated sage-grouse habitat) would be offered for sale, sold, or subsequently developed. There would be no impact to sage-grouse from this action. Sage-grouse habitat would continue to be managed by the BLM and the State of Montana in accordance with existing regulations.

Environmental Impacts - Alternative B Proposed Action

Anthropogenic features, including oil and gas well pads, may negatively affect GRSG habitat at various spatial scales. Numerous studies have shown that oil and gas development negatively affects sage-grouse lek persistence and attendance, nesting, brood-rearing and winter habitat selection, chick survival, and population growth rates. Several of those studies are briefly summarized below.

- In a study of sage-grouse in western Wyoming, Holloran (2005) observed that greater sage-grouse avoided breeding within or near development boundaries of natural gas fields, and that the number of displaying males declined as distances from leks to gas-field-related disturbance sources decreased (i.e., drilling rigs, producing wells, and main haul roads), and as traffic volumes within 3 km of leks increased.
- Holloran and others (2010) noted that sage-grouse adult males and females exhibited strong fidelity to breeding sites and seasonal ranges, implying that population dispersal and response of a population to habitat fragmentation depends on yearling cohorts. Holloran noted that nesting yearling females avoided nesting within 950 meters (about 1 km / 0.6 mile) of natural gas infrastructure, and that a female will nest within a 272-ha area (672 acres) over its lifetime. Yearling females appeared to select nesting sites at the spatial scare of their lifetime nesting areas, and avoided areas within the infrastructure of natural-gas fields.
- After controlling for habitat, Walker et al. (2007) found support for negative effects of coal bed natural gas (CBNG) development within 0.8-km and 3.2-km of the lek and for a time lag between CBNG development and lek disappearance.
- Dinkins and others (2014) observed that sage grouse selected habitat with lower densities of oil and gas structures at all reproductive stages.
- Johnson et al. (2011) found that, across the range of the species, trends on leks within 5.0-km of a producing oil or natural gas well were depressed.
- Holloran et al. (2015) found that GRSG avoided areas with high well pad densities in southwestern Wyoming during the winter regardless of differences in activity levels associated with well pads.

- Doherty et al. (2008) found that GRSG were 1.3 times more likely to occupy sagebrush habitats that lacked CBNG wells within a 4-km^2 area, compared to those that had the maximum density of 12.3-wells/4.0-km^2 allowed on federal lands, and that GRSG avoid CBNG development in otherwise suitable winter habitat.

Offering parcels for lease would have no direct effects on sage-grouse and greater sage-grouse habitat. Indirect effects may occur at the time the leases are developed at the APD stage. At the leasing stage, which this document covers, the location and extent of development is unknown. Project specific proposals would be evaluated at the Application for Permit to Drill (APD) stage, and would undergo NEPA review as well as proceed through a review by the MT Sage-Grouse program. It is at this time that project specific avoidance and minimization measures would be identified, as well as compensatory mitigation for residual effects.

However, reasonably foreseeable development scenarios were completed across MT/Dakotas for this sale based upon development potentials identified in the applicable RMPs. These RFDs are summarized in Appendix D. The BLM estimates approximately 35 to 38 wells may be constructed over the 10-year life of this lease sale. The majority of the wells are anticipated in Carbon or Musselshell Counties (up to 20 wells), followed by 7 to 9 wells across the Miles City Field Office, 4 or 5 wells across the HiLine, 1 well in Beaverhead or Madison County (Dillon FO), and 1 well in Bowman County, ND. The Lewis and Clark County projected wells are not in sage-grouse habitat. It is worth noting that the Billings RFD of two wells per year likely overestimates the number of potential wells. In the last 10 years, there have been nine APDs approved within the Billings Field Office boundary, including eight APDs in Carbon County and one in Stillwater County (Billings March 13, 2018 Oil and Gas Lease Sale EA, Appendix G, page 8).

The BLM assigned stipulations to avoid and minimize impacts to any oil and gas development occurring in designated sage-grouse habitat, including:

- **PHMA**

  No Surface Occupancy (NSO) 11-79 Miles City, NSO 11-111 North Dakota, NSO 11-127 Billings, NSO 11-152 HiLine, and NSO 11-159 Dillon.
  Surface occupancy and use is prohibited within Greater Sage-Grouse PHMA.
- **GHMA**
  - **Controlled Surface Use (CSU) 12-30 Miles City.**
    Surface occupancy and use within 2 miles of the perimeter of a lek active within the past 5 years may be restricted or prohibited…
  - **CSU 12-69 Dillon.**
    In General Habitat Management Areas (GHMA), parcels would be offered for lease subject to Controlled Surface Use restrictions (including RDFs). Activities will be avoided within the following distances from a sage-grouse lek… infrastructure related to energy development within 3.1 miles of leks.
  - **TL 13-40 Billings.**
    Surface use is prohibited from March 1 through June 30 within 3 miles of sage grouse leks.
  - **NSO 11-80 Miles City, NSO 11-128 Billings, NSO 11-151 HiLine.**
    Surface occupancy and use is prohibited within 6/10 mile of the perimeter of sage-grouse leks.
- **Winter Range**
  - **Timing Limitation (TL) 13-14 Dillon and TL 13-48 HiLine.**
    No surface use December 1 – May 15 in winter range;
  - **NSO 11-136 Billings**.
    Surface occupancy and use is prohibited in crucial winter range.

In this proposed sale, 53 parcels fall within PHMA and two parcels in RHMA (Miles City designated these areas PRB 2 RHMA based on coal development, not fluid minerals; therefore PHMA stipulations apply to these parcels not the Cedar Creek RHMA stipulation). Of those, nine parcels are deferred: one in Billings Field Office/Carbon County, and eight in Lewistown Field Office. All or aliquot portions of forty-six parcels are no surface occupancy. As such, impacts to greater sage-grouse habitat on the parcels in PHMA would be avoided. In this proposed sale, 39 parcels lie within GHMA. Of those, eight parcels are deferred: five in Lewistown FO, two in Billings FO, and one in Butte FO (state designated general habitat). All or aliquot portions of the remaining 31 parcels are subject to a combination of NSO, controlled surface use, and/or timing limitations. Impacts to sage grouse general habitat are thus avoided or minimized.

The public previously identified a concern that No Surface Occupancy would simply shift the impact off site where the NSO no longer applies. The length of a directional drill is typically less than two miles, with some very rare exceptions of distances of up to four miles (personal communication with BLM fluid minerals staff; July 2018). In these instances, a project proponent would still need to demonstrate compliance with MT EO 12-2015. Requirements of MT EO 12-2015, include, but are not limited to:

- No surface occupancy (NSO) within 0.6 mile of an active lek in core habitat,
- Timing restrictions outside the NSO perimeter up to 4 miles from an active lek in core habitat (March 15 – July 15 for breeding, nesting, and early brood-rearing habitat, December 1 – March 15 for winter concentration areas),
- NSO within 0.25 miles of an active like in general habitat, and
- Timing restrictions up to 2 miles from an active lek in general habitat.

Lastly, both the BLM and the State of Montana limit density / detrimental disturbance of suitable sage grouse habitat within the area affected by a project to five percent disturbance. Well pad densities may not exceed an average of one per square mile. According to the MT EO, any proposals for deviations from these stipulations, undefined activities, or exceptions must demonstrate that the proposed activities will not cause declines in sage grouse populations in core areas.

The BLM analyzed the effects of managing sage grouse habitat in accordance with the BLM stipulations in the FEIS for each applicable RMP, and that analysis is hereby incorporated by reference into this analysis. In the 2015 Record of Decisions, the BLM determined that these stipulations strike a balance between long-term conservation of public land and resources with commodity production, recreation access, and services, and provide a layered management approach that offers the heighted level of protection for sage-grouse in the most valuable habitat. (Rocky Mountain ROD Alt D/Billings, page 3-15; Alt E/HiLine and Miles City page 3-19).

As previously noted, 49 parcels in this sale lie with the 3.1-mile lek buffer distance. There are 171 active leks the lie within four miles of proposed parcels, 53 of which lie within two miles of proposed parcels. Based upon the RFD, approximately 35 to 38 oil/gas wells could conceivably be constructed over the 10-year life of this sale. Development in the 31 parcels with no existing disturbance and high or medium development potential have a greater chance of impacting sage-grouse habitat compared to the two parcels within existing disturbance, or the 16 parcels with no existing disturbance but low development potential (**Table 1**).

Both the BLM and MT sage-grouse regulations, as currently written, are consistent with the CEQ guidelines on mitigation (40 CFR § 1508.20). Any project proponent must demonstrate that they have first avoided and minimized impacts to sage-grouse habitat, and then provide compensation for unavoidable or residual impacts. While the effects of any specific oil and gas development project are unknown at the leasing state, the regulatory mechanisms in place for both the BLM and State of Montana EO are sufficient to ensure habitat conservation, and to mitigate specific threats to the species.

Environmental Impacts - Alternative C

Under Alternative C, the BLM would defer Parcels MTM 105431 GD, GG, and GH in Beaverhead County because development of these parcels poses a development threat to an active lek that lies outside of BLM or State of Montana designated habitat. Nine male sage-grouse were counted on this lek in 2018.

Parcel GD is located in GHMA, which is subject to CSU 12-69 (infrastructure development related to energy will be avoided within 3.1 miles of leks). Portions of Parcels GG and GH are located in PHMA, which are subject to NSO 11-159, no surface occupancy.

The Frying Pan lek is located on BLM surface about 2.2 miles from designated BLM GHMA and 2.9 miles from designated PHMA. The lek is located 1.7 miles from State of Montana designated general habitat and 2.9 miles from designated State of Montana core habitat. Because the lek lies outside of designated habitat, neither the BLM ARMP nor the Montana Executive Order apply.

By deferring Parcels GD, GG and GH, the BLM will avoid impacts to the Frying Pan lek from oil/gas leasing. These parcels would be deferred pending further review of the adequacy of the Dillon ARMP to provide the appropriate level of protection for this area.

Under Alternative C, the BLM would remove 76 parcels that contain greater sage-grouse habitat from the December 2018 due to ongoing litigation, but could include these parcels in a subsequent sale consistent with a recent court order. If these parcels are included in a future sale, they would be subject to a 30-day comment period. While leasing is avoided for now, it would be reasonably foreseeable that these parcels would be back on a future sale. All of the sage-grouse parcels are already protected by no surface occupancy (PHMA), or Controlled Surface Use or Timing Limitations (GHMA). All of the parcels would have to be leased in a manner consistent with the applicable ARMP and Montana Executive Order (EO 12-2015).

Cumulative Impacts

Approximately 64 percent of sage-grouse habitat in Montana is in private ownership. Therefore, managing threats to the species across all lands is important to conserving sage-grouse habitat in the state. The State of Montana intends to formally adopt a Habitat Quantification Tool and Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse by the end of 2018. BLM has been participating in this stakeholder process to construct these documents, which recently went through peer review and public comment and are being considered by the MT Sage-Grouse Oversight Team for rule-making. The HQT document will provide the methodology for assessing direct/indirect impacts and quantifying debits and credits; the policy guidance document defines the processes and information necessary to create, buy, or sell mitigation credits suitable for meeting sage grouse mitigation requirements within the State of Montana. The BLM Montana/Dakotas intends to sign a memorandum of understanding with the State of Montana outlining coordinated implementation of Montana's Mitigation System to consistently manage sage grouse habitat on all private, state, and federal lands in Montana.

Of the eleven western states with sage-grouse habitat, Montana is the only state not currently working on amendments to the 2015 sage-grouse plans. The State of Wyoming is proposing to amend their plan to improve management and coordination across the range of Greater Sage-Grouse in Wyoming. Key aspects of their proposed action are to:

- Ensure that the BLM has the flexibility to automatically update habitat management areas based on information consistent with the State of Wyoming's core areas
- Remove the sagebrush focal area designation

- Clarify the use of the habitat objectives tables
- Ensure that noise thresholds and monitoring outlined in EO 2015-4 are applicable only to leks inside priority habitat management area (PHMA)/core
- Define a process to review and reverse adaptive management actions once the identified causal factor is resolved
- Follow the State of Wyoming's Greater Sage-Grouse Compensatory Mitigation Framework.

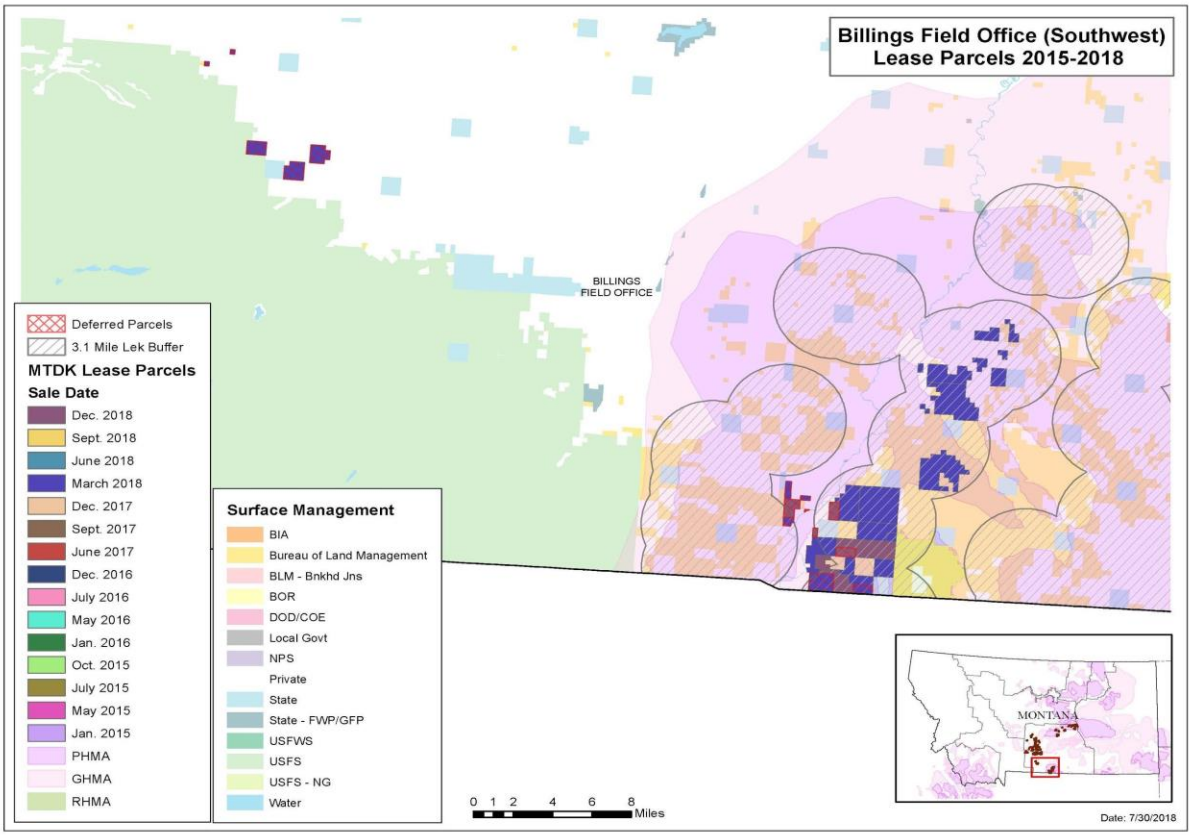
Similar to Montana, the Wyoming framework is intended to conserve sage-grouse habitat in their state, although state specific requirements such as mitigation may vary. As such, Wyoming's amendments should have a neutral effect on sage-grouse habitat conservation across our common boundaries.

The December 2018 lease sale is one sale in part of a nationwide mineral leasing program, whereby the BLM offers federal minerals for sale. In accordance with the Federal Onshore Oil and Gas Leasing Reform Act of 1987 and BLM Manual 3120, each BLM state office will hold sales at least quarterly if lands are available for competitive leasing. The last three previous sales in the MT/Dakotas included North Dakota (June 2018 sale), Billings, HiLine, Butte (March 2018 sale), Miles City (December 2017 sale). Going forward, the BLM anticipates offering parcels across any District in the MT/Dakotas where EOIs have been submitted. The direct, indirect, and cumulative effects of a minerals leasing program were evaluated in the FEIS for the applicable RMPs and that analysis is incorporated by reference into this EA.

Oil and gas development potential is highly variable across the Montana/Dakotas. It is relatively low for Park, Madison and Beaverhead counties. Development pressure is much higher across the HiLine and eastern Montana. In 2017, the highest producers of oil were Fallon County, Roosevelt County, and Sheridan County. The 2017 highest gas producers were Phillips County, Fallon County, and Blaine County. Refer to the detailed RFDs in the project file.

The BLM produced maps overlaying sage-grouse habitat, 3.1 mile lek buffers, and parcels approved or deferred dating back to October 2015, which corresponds to when the 2015 sage-grouse amendments were approved. Figure 4 below depicts the cumulative effects of parcels leased in the southwest portion of the Billings Field Office. Additional maps for other areas in the sale are included in the project record. As the map shows, there is potential for sage-grouse habitat to be impacted from multiple years of oil/gas leasing. However, both the BLM RMPs and the State of Montana stipulations for developing in sage-grouse habitat apply, and a full suite of mitigation options are available to avoid/mitigate impacts, including compensatory mitigation. The regulations, as currently in effect, should be sufficient to conserve habitat and mitigate threats.

Figure 4: Map depicting oil/gas parcels leased in sage-grouse habitat from October 2015 to present.



Conclusion

The public's primary concern is that the BLM is allegedly not conserving sage-grouse habitat because the agency is not prioritizing leasing outside sage-grouse habitat, in violation of the applicable RMPs and FLPMA. It is an important distinction to note that the prioritization objective is not a resource allocation or management decision. The RMPs identified areas open/closed to fluid mineral leasing (allocations) and established management decisions to avoid/minimize impacts to sage-grouse habitat (stipulations). Together with the State of Montana Sage-Grouse Habitat Conservation Program, there are adequate regulatory mechanisms in place to conserve sage-grouse habitat across Montana/Dakotas, as the BLM plans are currently written. The proposed lease sale incorporates all applicable stipulations to avoid/minimize impacts to sage-grouse habitat consistent with the allocation and management decisions in each applicable ARMP and in compliance with FLPMA. Lastly, when the BLM identified a situation where a lek was not protected by existing regulations (i.e. potential mapping error), it developed Alternative C to avoid impacting the habitat.

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